HOCHSCHULE FÜR TECHNIK UND WIRTSCHAFT DRESDEN UNIVERSITY OF APPLIED SCIENCES

Dresden University of Applied Sciences

Something about myself: Paul Ernst **Ludwig Paditz**

Education:

Diploma mathematics, TU Dresden, Germany, 1974.

Doctor Natural Science (Dr.rer.nat.), TU, Dresden, Germany, 1977.

Postgrad., State University, St. Petersburg, Russia, 1984-1985.

Habilitation (Dr.rer.nat.habil.), HfV Dresden, Germany, 1989.

Working:

Assistant, department mathematics, TU Dresden, 1977-1979.

Head assistant, HfV Dresden, Institute of Mathematics, 1979-1991,

applied professor, HfV Dresden, 1992.

Professor, Faculty informatics/mathematics, Univ. of Applied Sciences, Dresden, since 1992.

Opportunities and methods of using ClassPad

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Using CAS in Math Education – first experience in Germany with the newest ClassPad technology CP400

Preface:

Ministry of Education in Saxony/Germany introduced 2004:
Modern Math Education with CAS, DGS and TC
beginning in the 8th class upto 12th class,
using graphic calculators (GTR)

CAS – Computer Algebra Systems
DGS – Dynamic Geometry Software
TC – Spreadsheet (Table Calculation)

8th class:

- Knowledge of the use of CAS when forming more complex terms and equations

- Investigating the influence of parameters in the function equation to trace the graph with DGS, TC, GTR or CAS

- Finding equations for measurement series with the help of linear regression with GTR, CAS or TC

- Solving linear systems of equations with more complex coefficients with GTR or CAS (two equations with two unknown variables)

9th class:

Functions and Powers

Mastered of determining zero quadratic functions, graphical solving quadratic equations and solving with GTR or CAS

10th class:

Obtaining the inverse function with CAS, graphical interpretation

Use of CAS to demonstrate the properties of functions
Obtaining illustrative of the limit concept

Know of parametric representation and polar coordinates to describe curves with GTR and CAS

11/12th class:

Differential calculus

The use of CAS in particular, should promote discovery learning, and support for substantive tasks, the reflection on the facts and the interpretation of the result.

Integral Calculus

The use of CAS in particular, should promote discovery learning, and support for substantive tasks, the reflection on the facts and the interpretation of the result.

worksheets:

- ☞ The use of worksheets in mathematics instruction has a long tradition.
- ☞ The use of a worksheet should guide the students to a structured work.
- ☞ Instead of an oral instruction, which requires a synchronous work of all students, the worksheet individually and with their own timing can be processed next.
- ☞ The sequence of the work orders in the worksheet helps to recognize the logical structure of a problem;
  the work procedures help to penetrate the question.

worksheets:

The disadvantage of a sheet of paper with work orders is seen, that the tools which can be used must be made available about. The students do not know always, how to carry out its solution steps in detail. Moreover, in a classic worksheet are missing the self check of the results, a feedback of the partial steps and also the visualization of the results.

The new developed **eActivity in the ClassPad** represents an extremely rich extension of the worksheet. The eActivity combines the written representation of the setting of tasks of a worksheet with the tool level of the ClassPad.
These tools are the individual menus or modules, which the ClassPad offers: Computer algebra system, dynamic geometry software, computer statistics, curve plotter, and much more.

eActivity:

Thus, all tasks can be worked on with the possibilities of the computer.

At the same time, the documentation of the work can be entered directly.

The found results can to be visualized immediately or the results may be in a hidden file, can be viewed.

It is an interactive work of the students, between setting of tasks and the results and control of the results themselves.

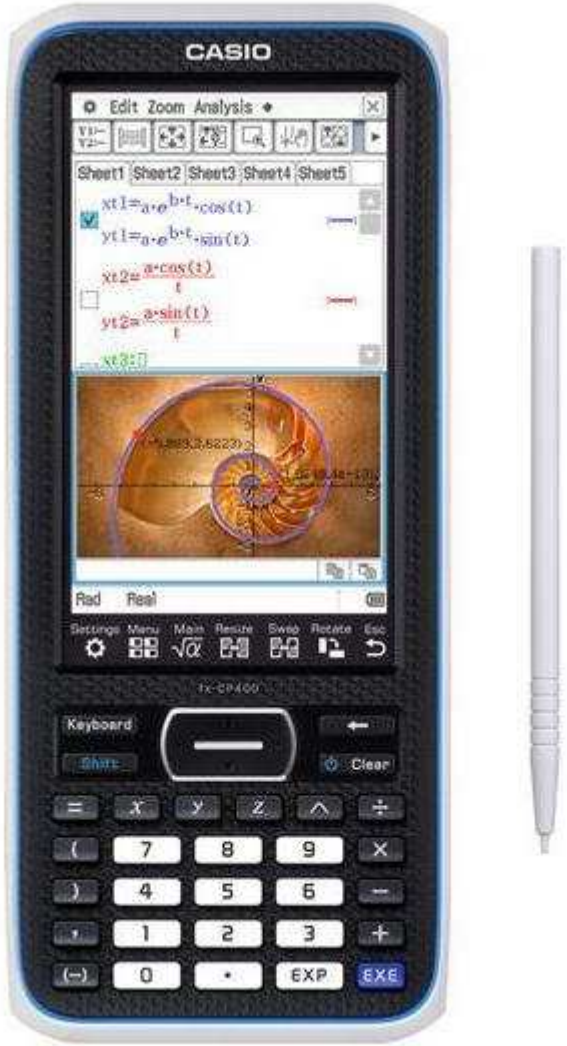
The tool – ClassPad 400:

Графический калькулятор
с сенсорным дисплеем

Fx-CP400 обладает рядом функций, помогающих школьникам лучше усваивать материал:

USB поддержка для быстрой и легкой передачи данных и совместимость с **проектором** CASIO для отображения информации на доске.

http://edu.casio.ru/fx-cp400/

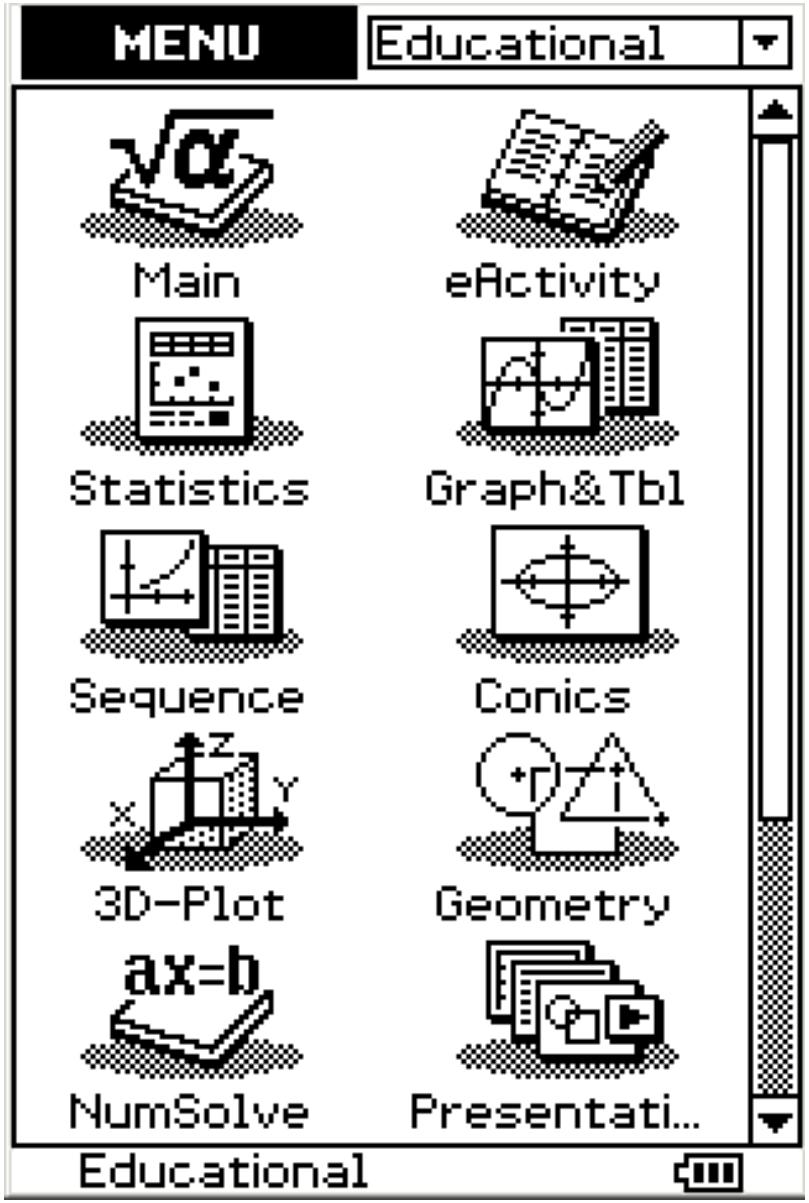


The tool – Beamer XJ-A146:

http://casio-projectors.ru/products/xja146/

eActivity – an example

According to the instructions from the formula construct a rhombus:



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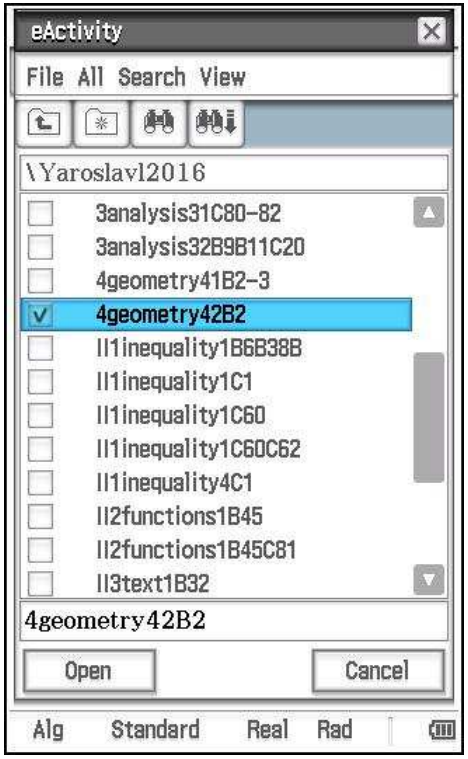
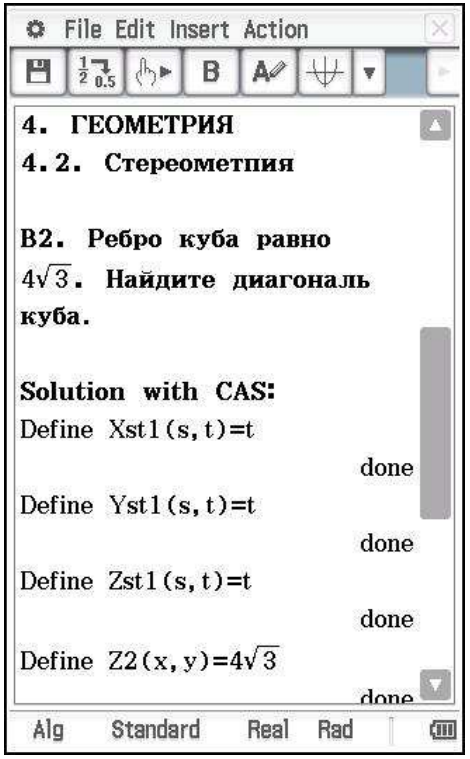
eActivity: 4. ГЕОМЕТРИЯ 4.2. Стереометпия

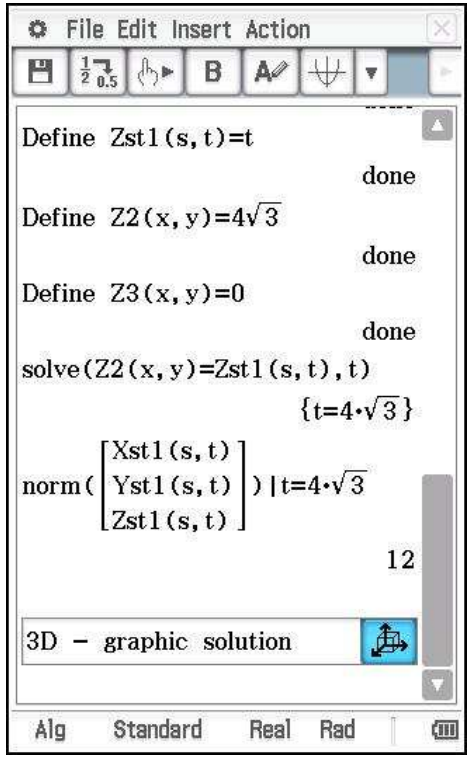
Ребро куба равно 4√(3). Найдите диагональ куба.

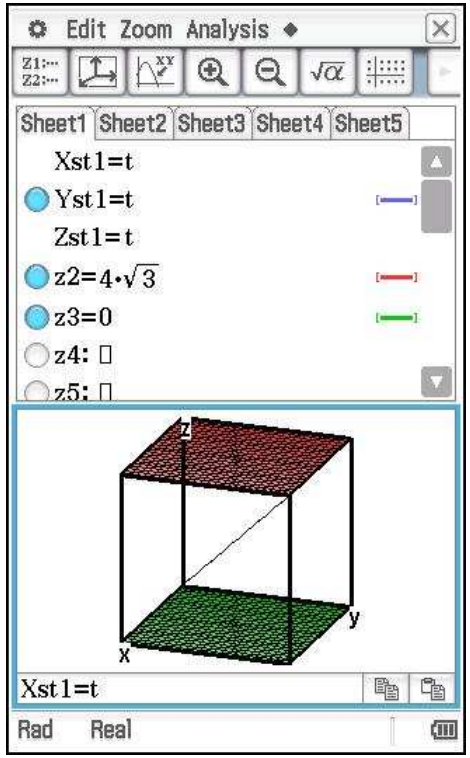


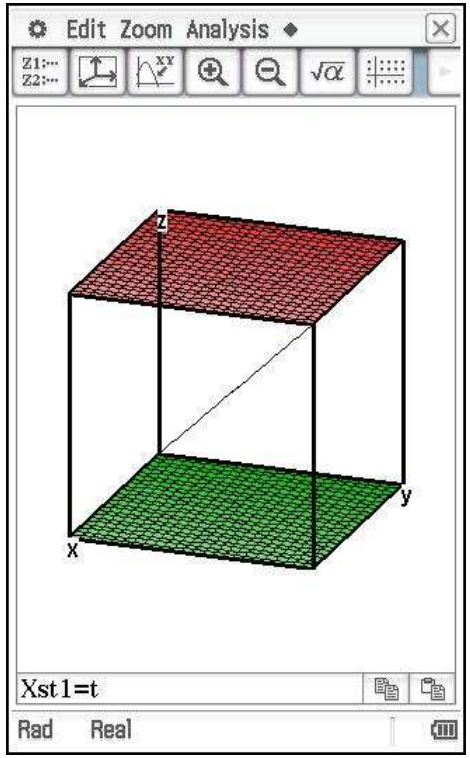


eActivity: 4. ГЕОМЕТРИЯ 4.2. Стереометпия

Ответ: диагональ куба равно 12.

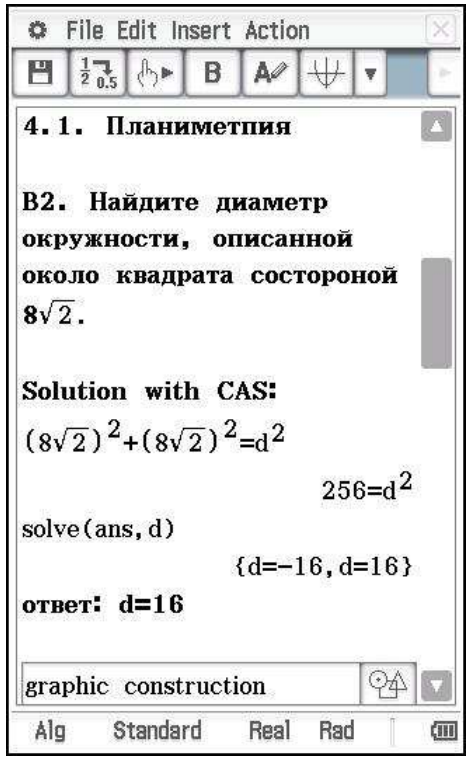


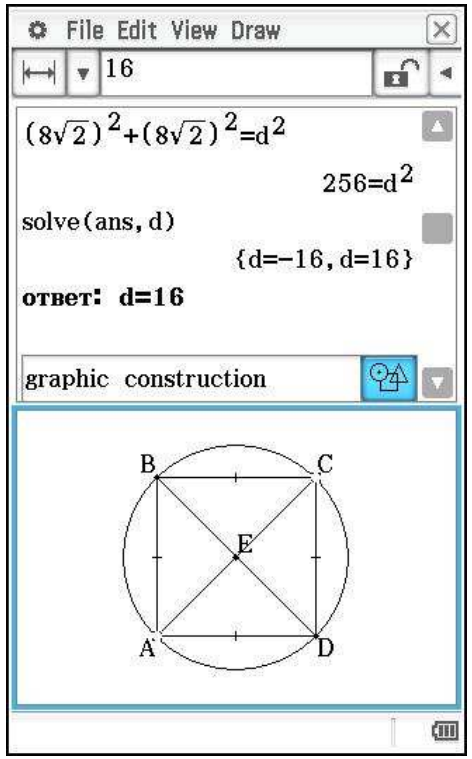




eActivity: 4. ГЕОМЕТРИЯ 4.1. Планиметпия

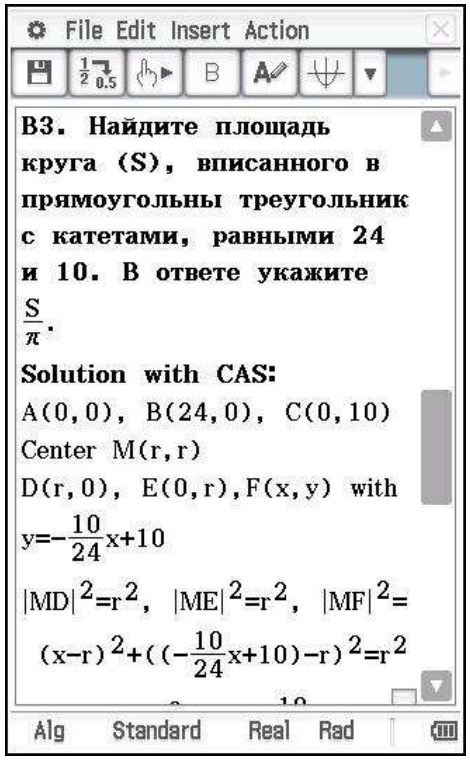
Найдите диаметр окружности, описанной около квадрата состороной 8√(2).

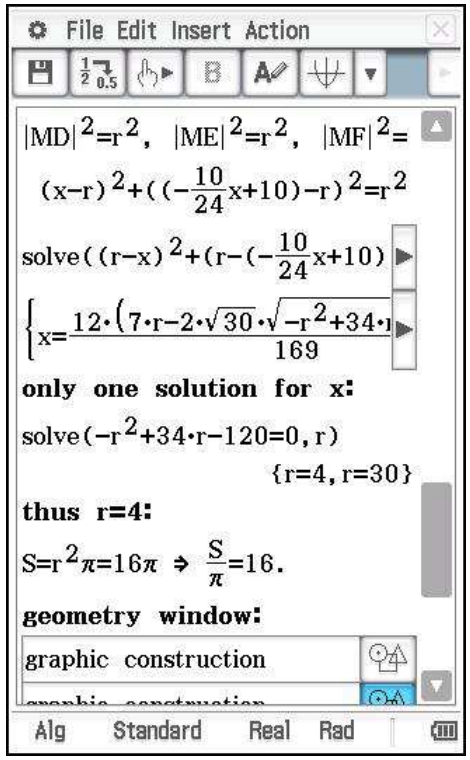


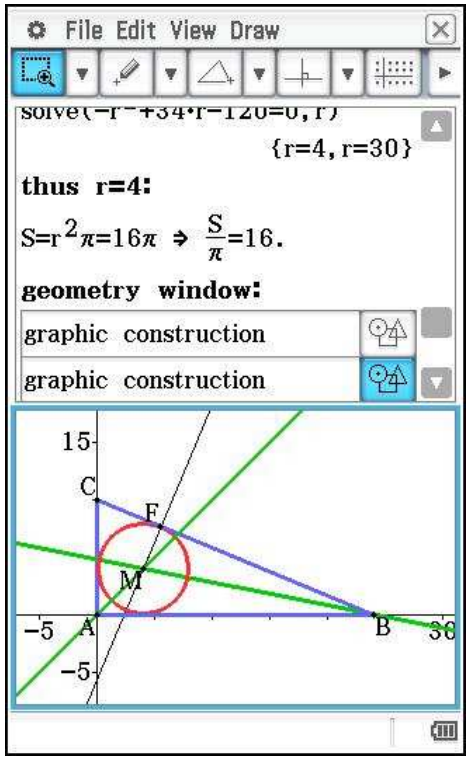


eActivity: 4. ГЕОМЕТРИЯ 4.1. Планиметпия

Найдите площадь круга (S), вписанного в прямо-угольны треугольник с катетами, равными 24 и 10. В ответе укажите S/π.







eActivity: 4. ГЕОМЕТРИЯ 4.1. Планиметпия

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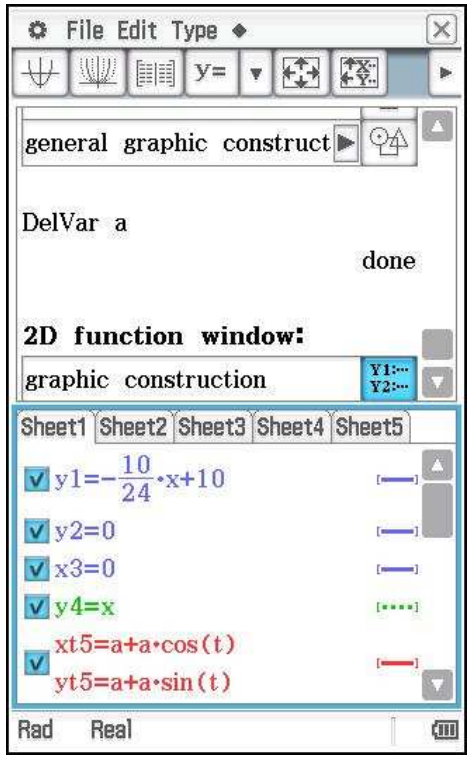

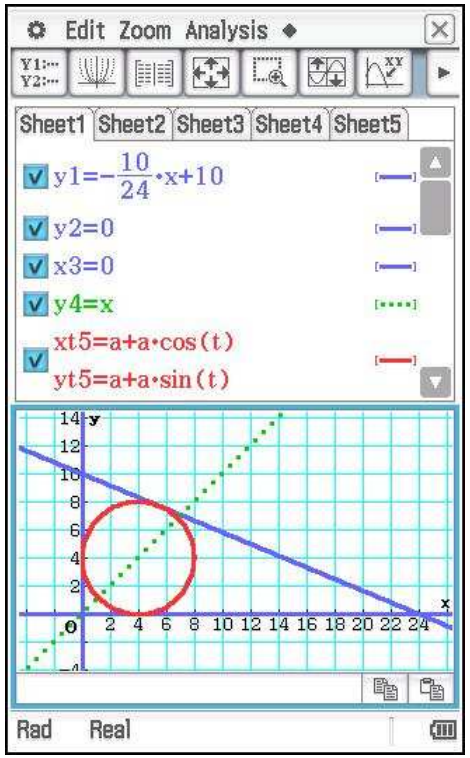

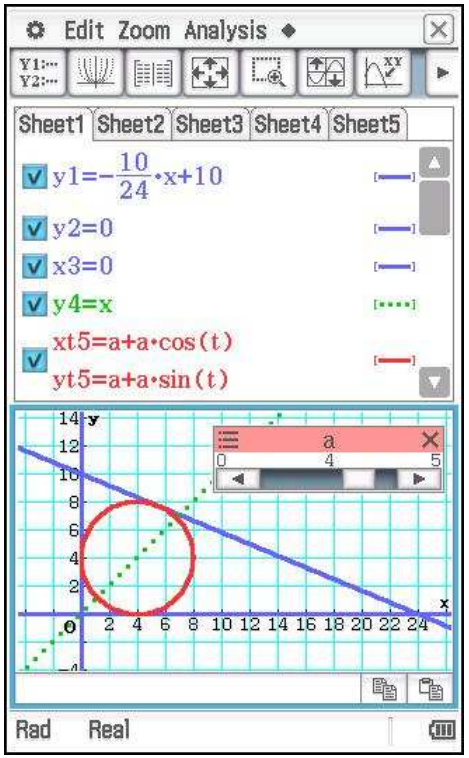

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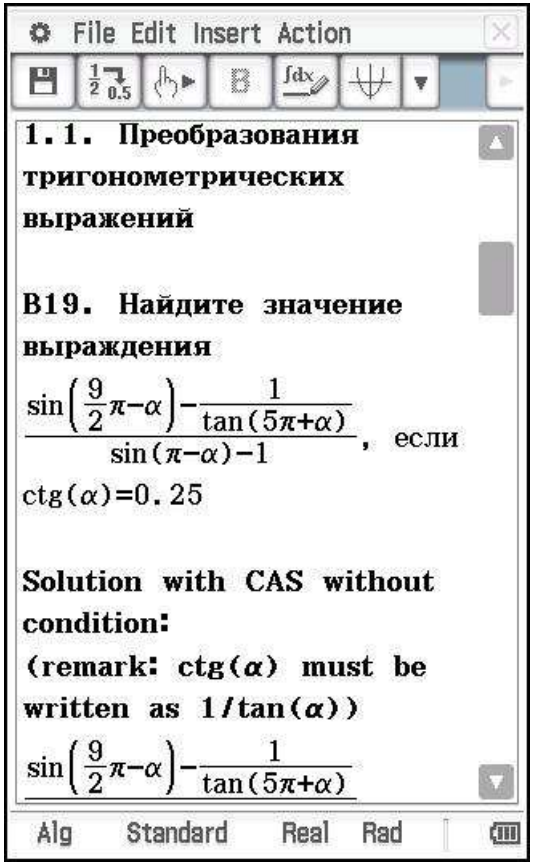
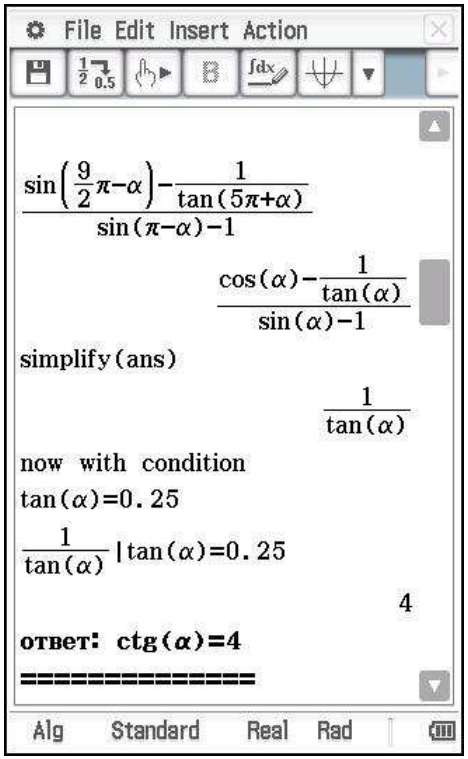
eActivity: 1. ТРИГОНОМЕТРИЯ

1.1. Преобразования тригонометрических выражений





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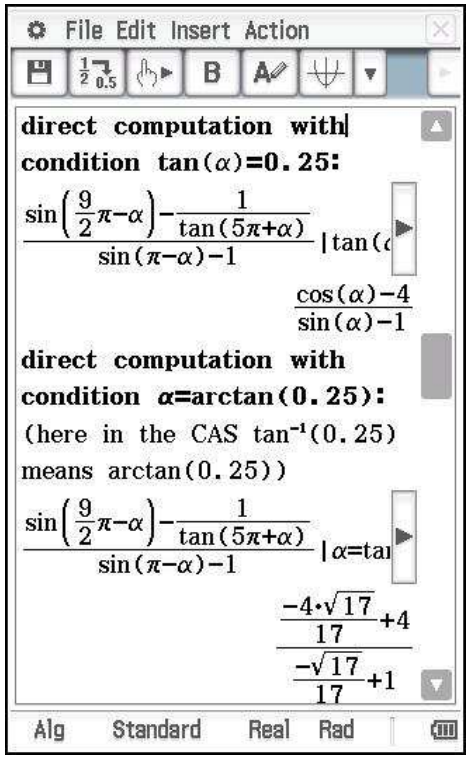
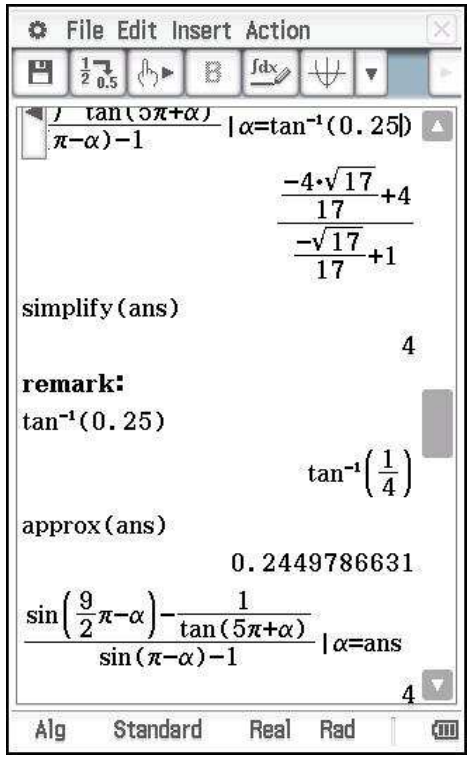
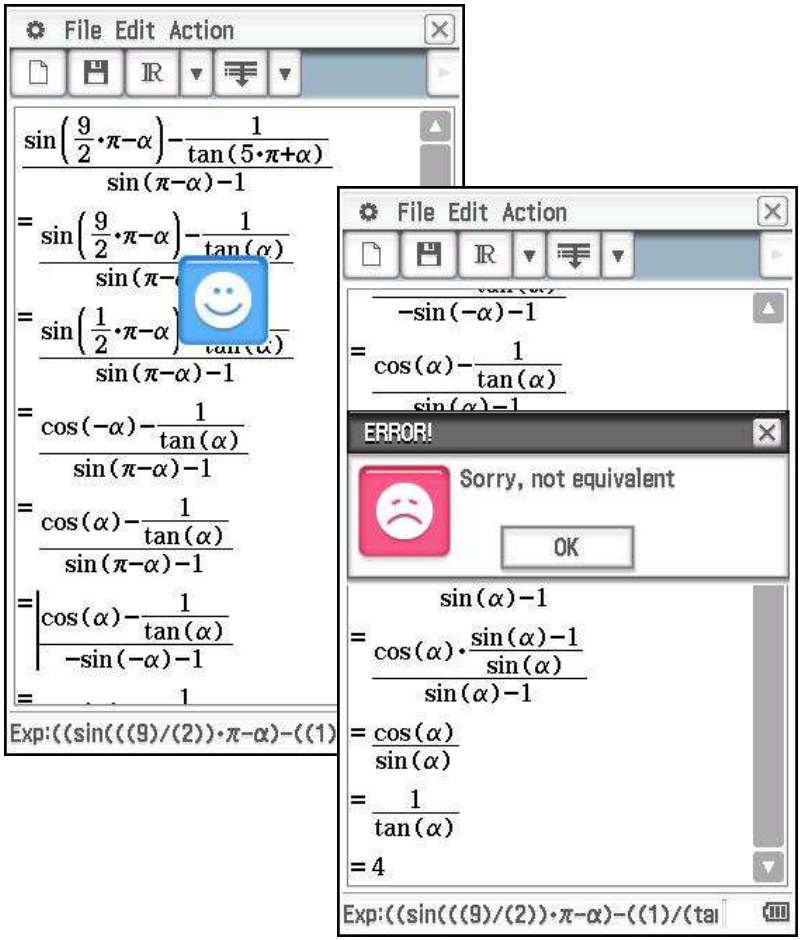
UNIVERSITY OF APPLIED SCIENCES

eActivity: 1. ТРИГОНОМЕТРИЯ

1.1. Преобразования тригонометрических выражений

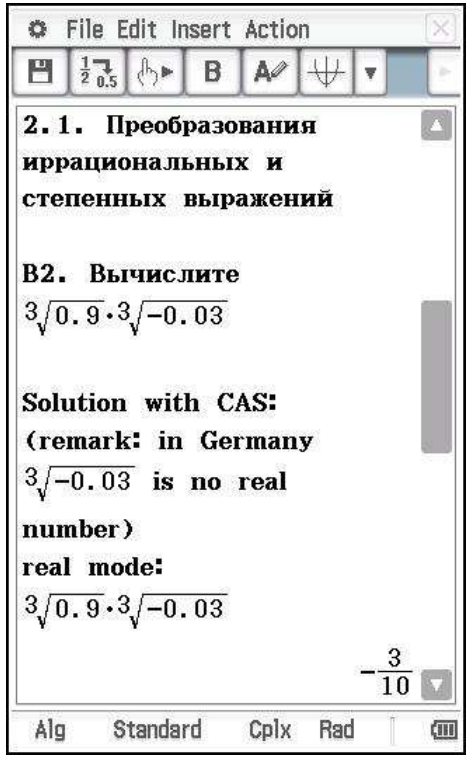


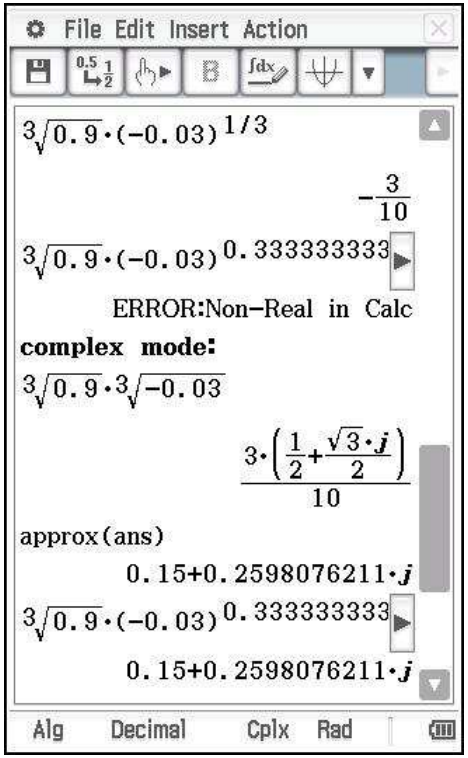




eActivity: 2. АЛГЕБРА

2.1. Преобразования иррациональных и степенных выражений





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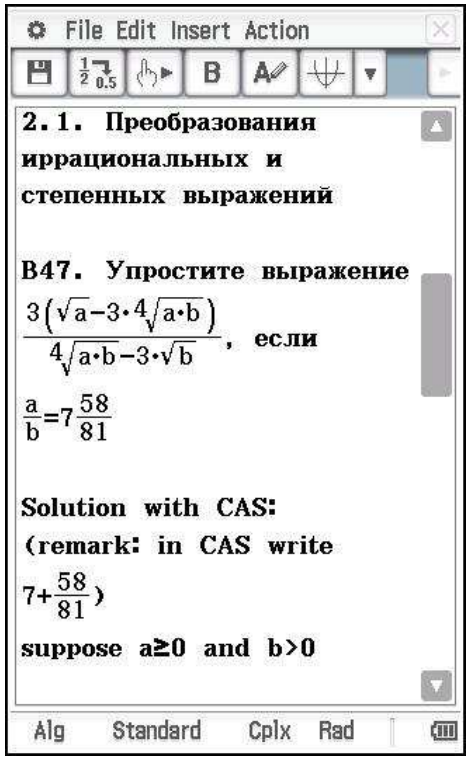
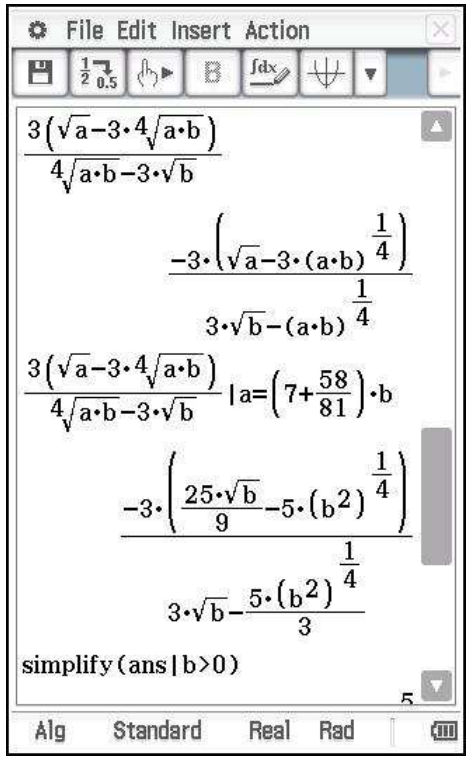
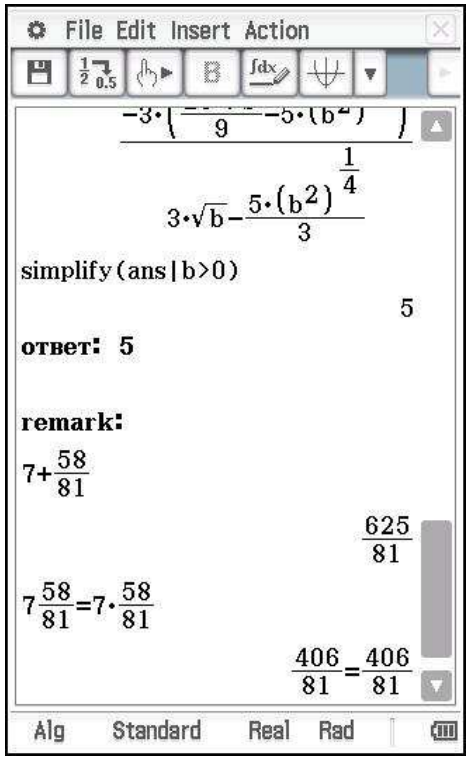
eActivity: 2. АЛГЕБРА

2.1. Преобразования иррациональных и степенных выражений

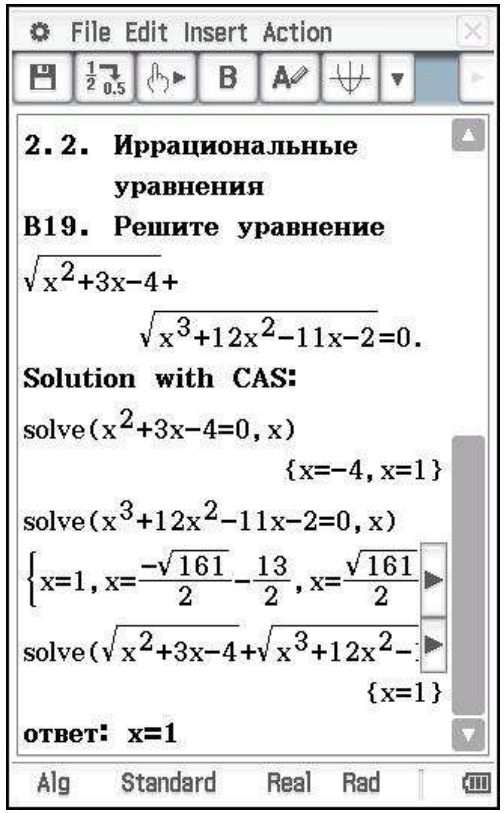


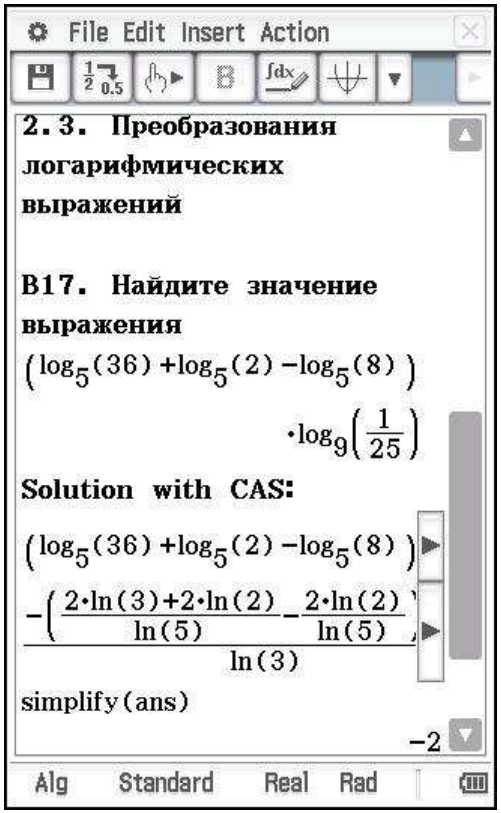


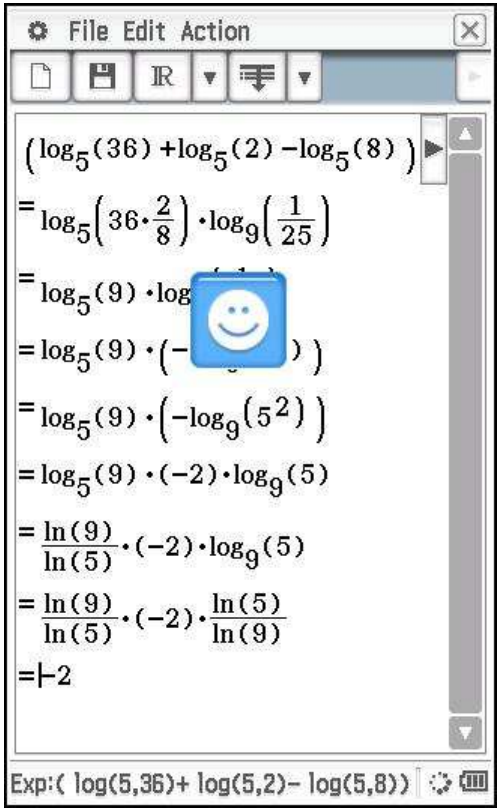


eActivity: 2. АЛГЕБРА

2.2. Иррациональные уравнения
2.3. Преобразования логарифмических выражений

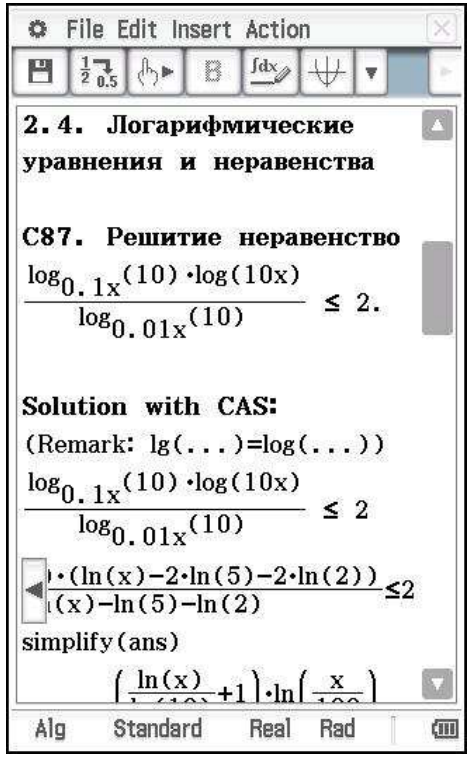


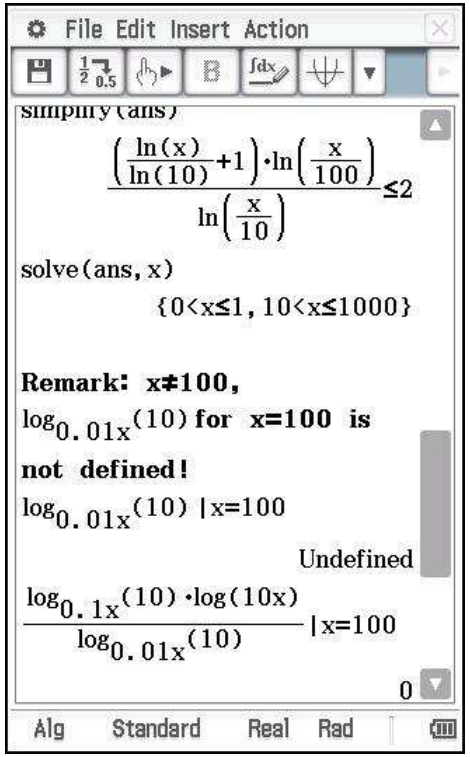


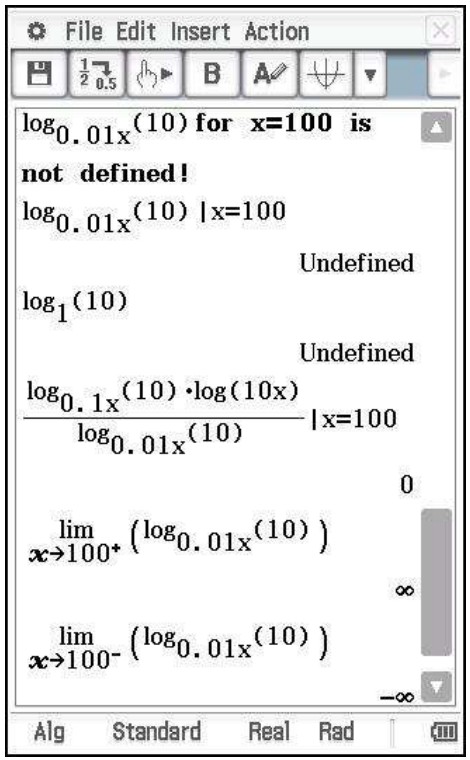


eActivity: 2. АЛГЕБРА

2.4. Логарифмические уравнения и неравенства

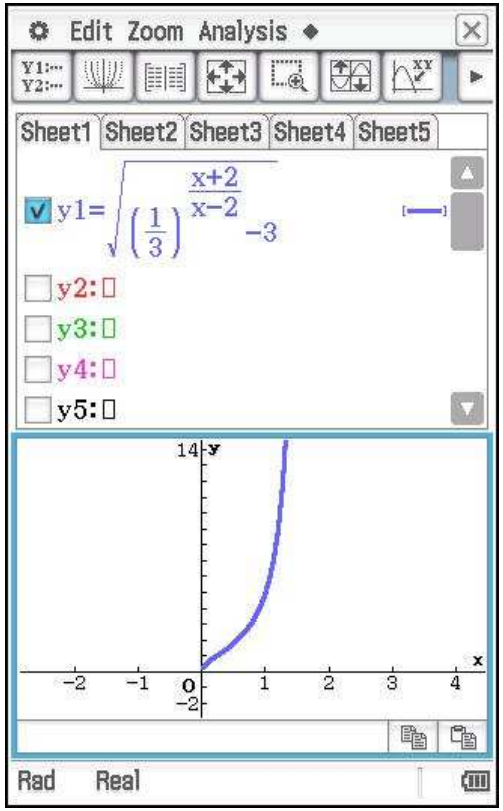


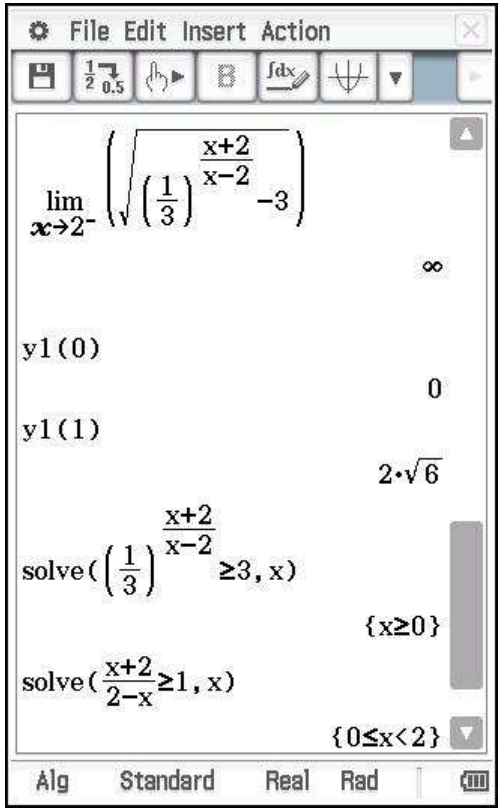




eActivity: 2. АЛГЕБРА

2.5. Показательные уравнения и неравенства

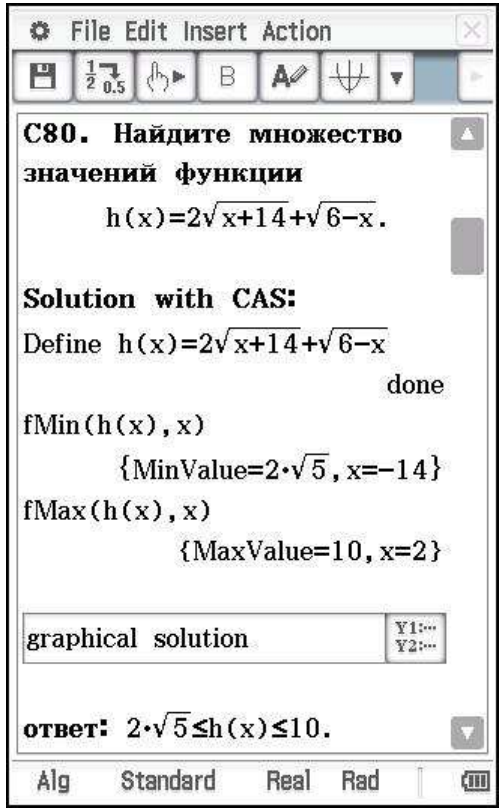


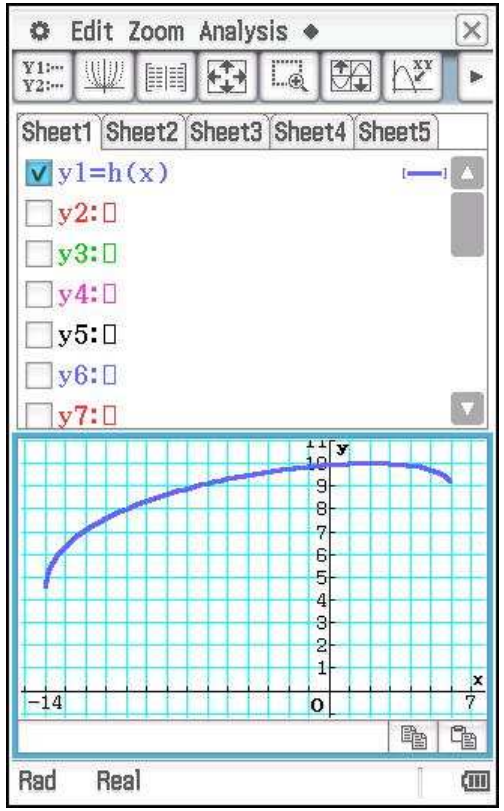


ответ: 2 (x=0, x=1)

eActivity: 3. ЭЛЕМЕНТЫ МАТЕМАТИЧСКОГО АНАЛИЗА

3.1. Производная функции

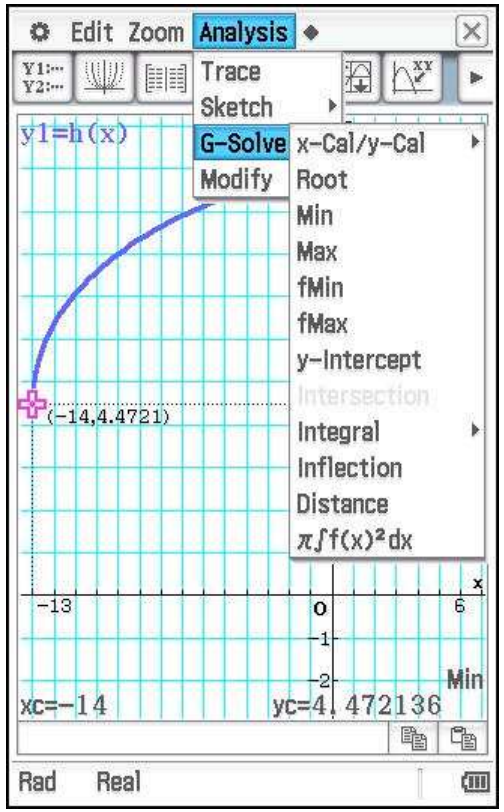


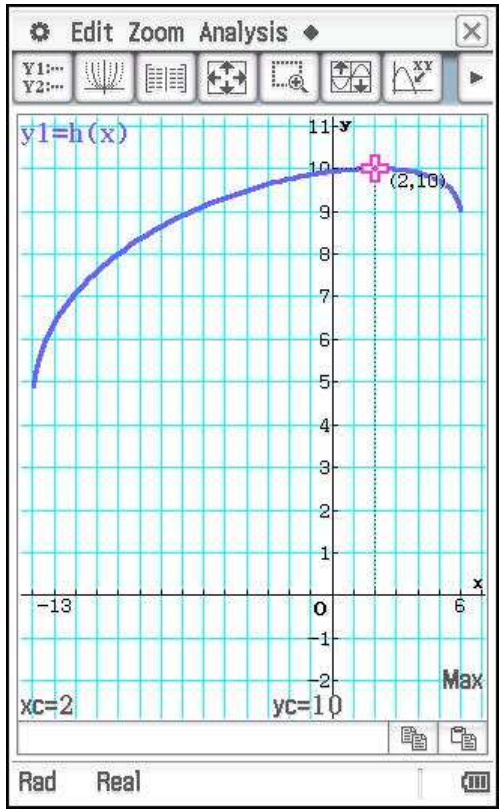


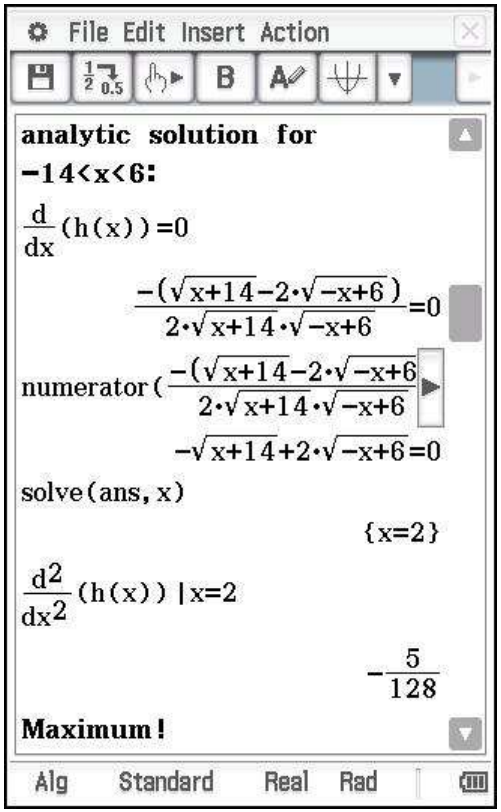
ответ: 2√(5)≤h(x)≤10

eActivity: 3. ЭЛЕМЕНТЫ МАТЕМАТИЧСКОГО АНАЛИЗА

3.1. Производная функции



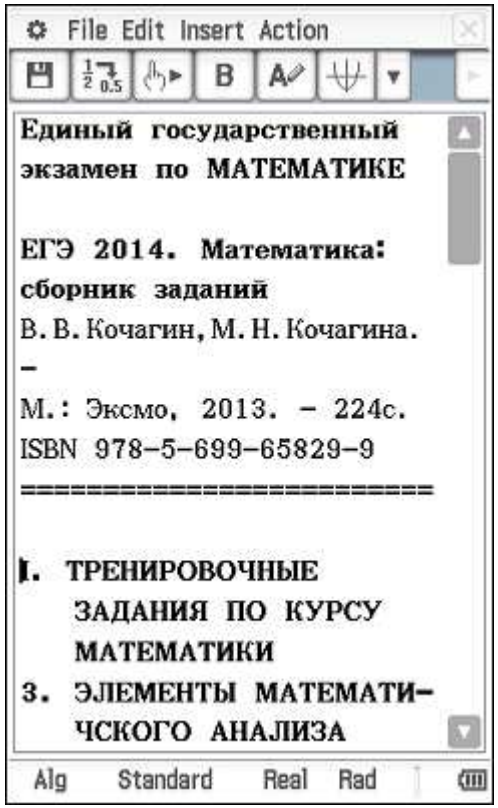


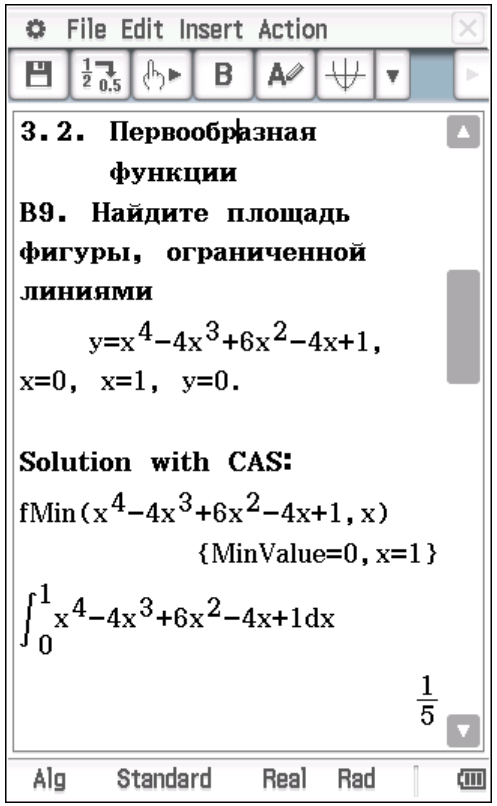


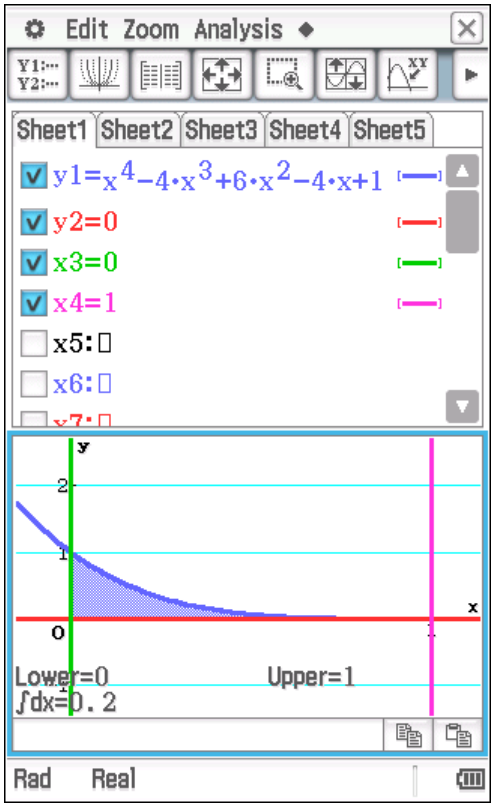
ответ: 4.472136≤h(x)≤10

eActivity: 3. ЭЛЕМЕНТЫ МАТЕМАТИЧСКОГО АНАЛИЗА

3.2. Первообразная функции



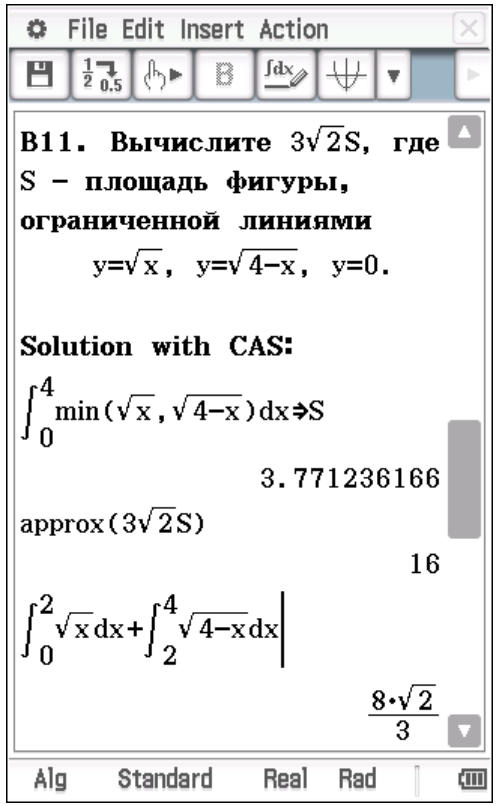


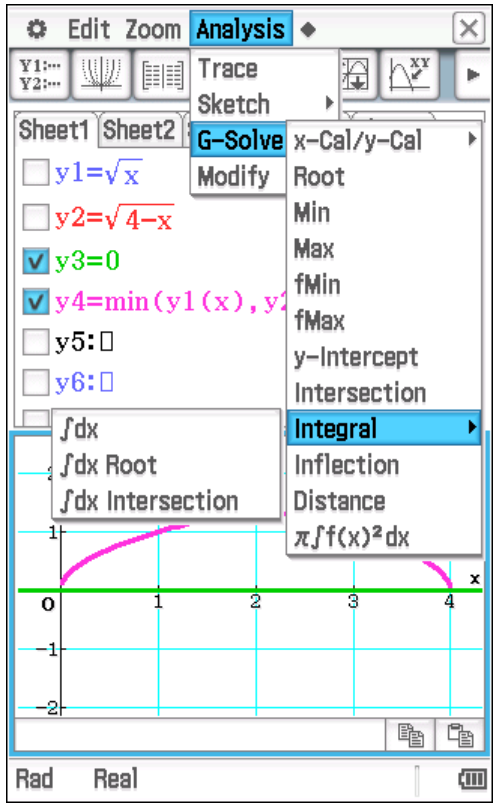


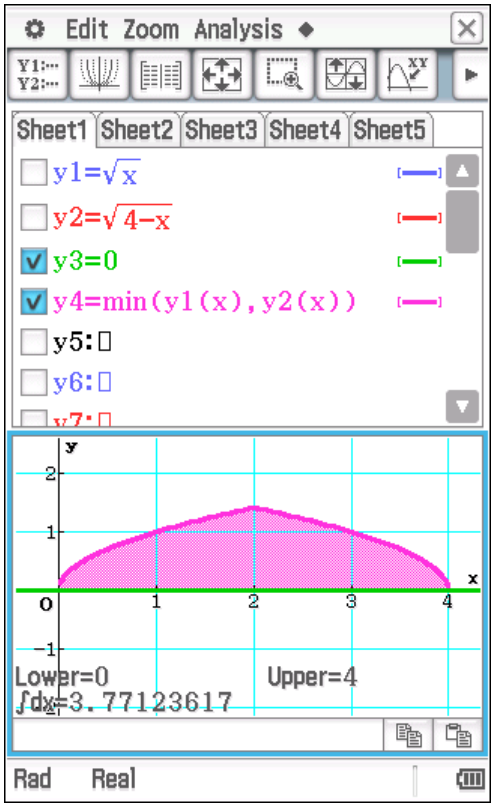
ответ: 0.2

eActivity: 3. ЭЛЕМЕНТЫ МАТЕМАТИЧСКОГО АНАЛИЗА

3.2. Первообразная функции



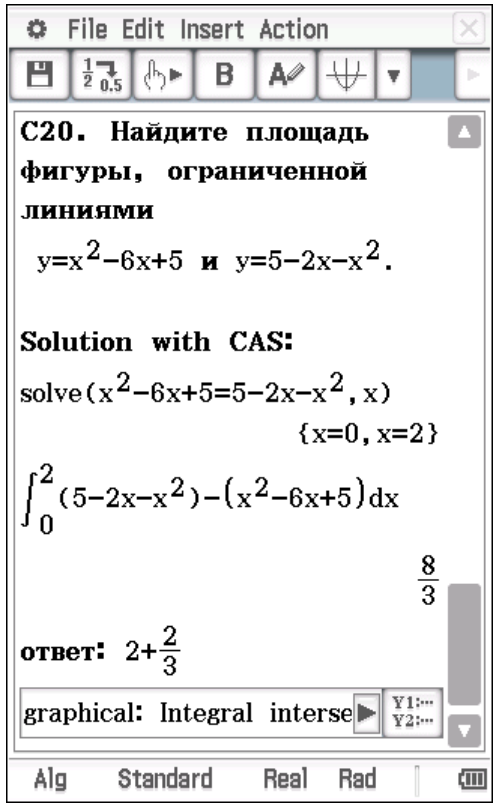


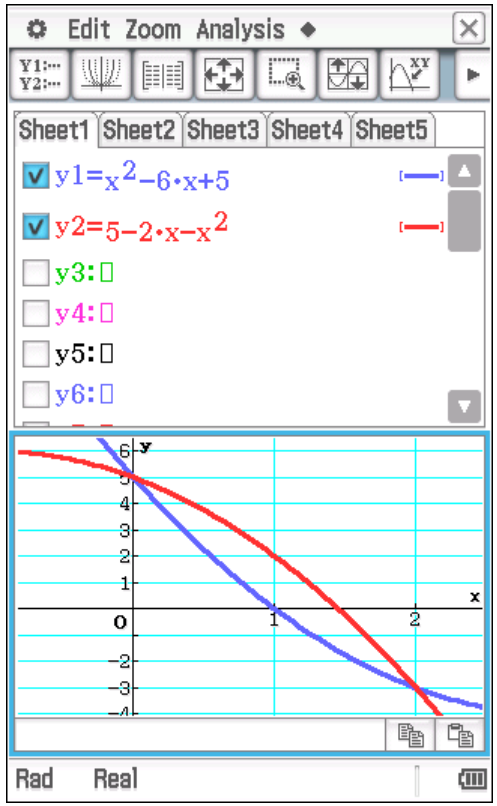


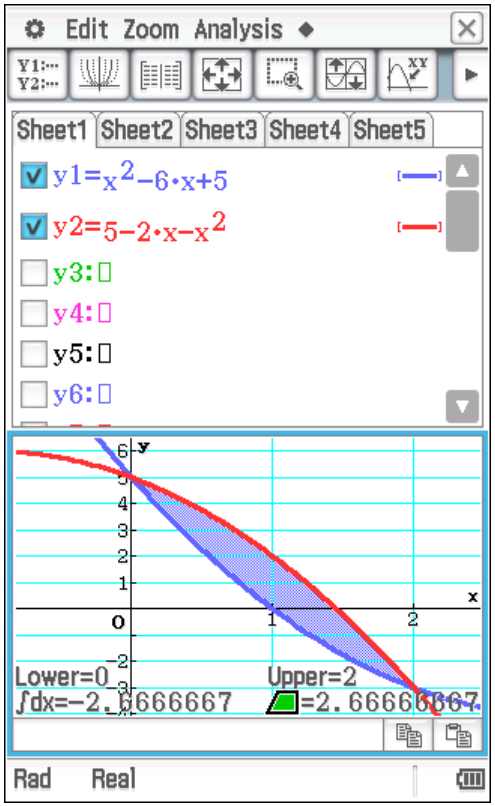
ответ: 16

eActivity: 3. ЭЛЕМЕНТЫ МАТЕМАТИЧСКОГО АНАЛИЗА

3.2. Первообразная функции



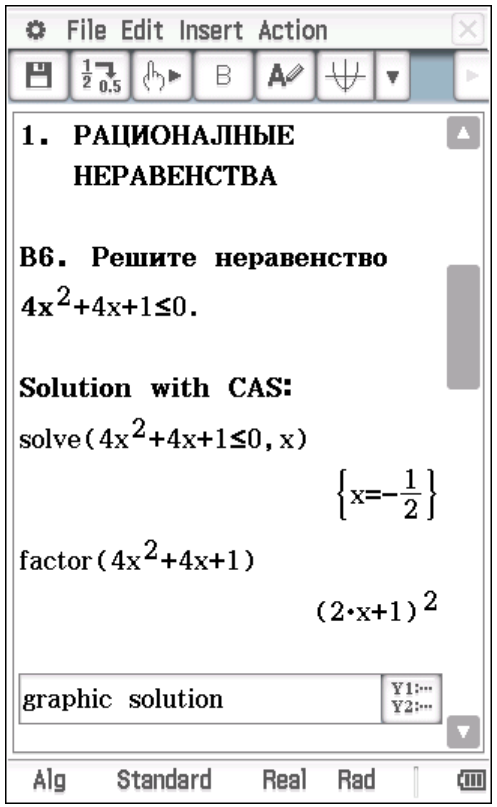


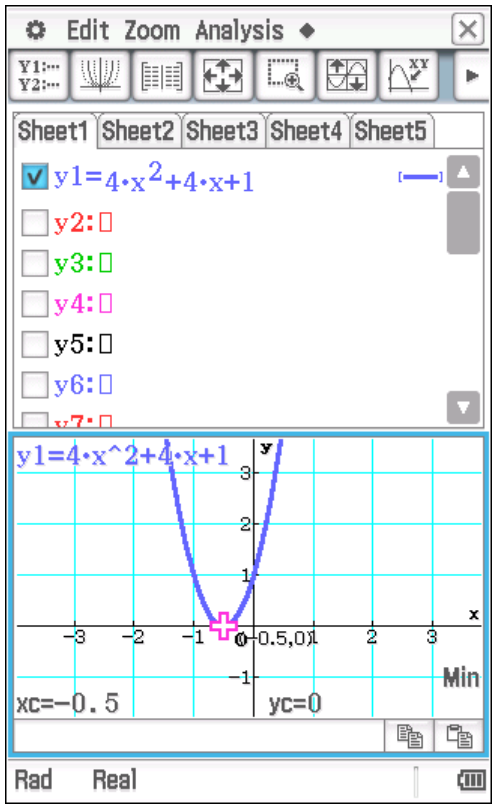


ответ: 2+2/3

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

1. РАЦИОНАЛНЫЕ НЕРАВЕНСТВА

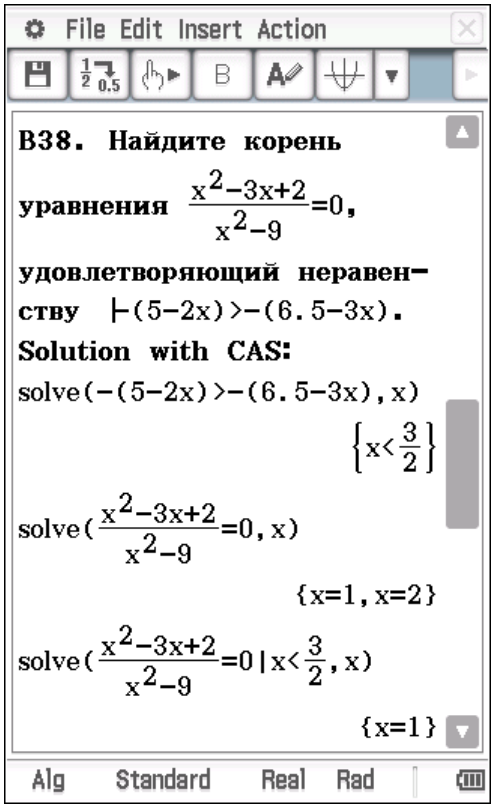


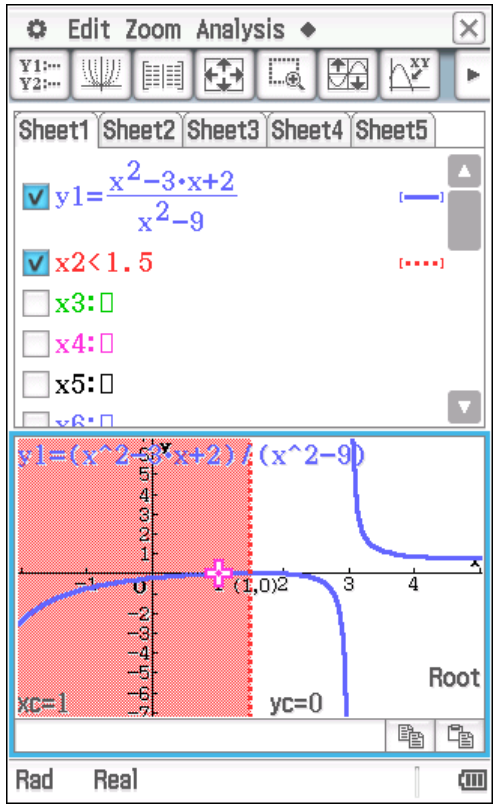


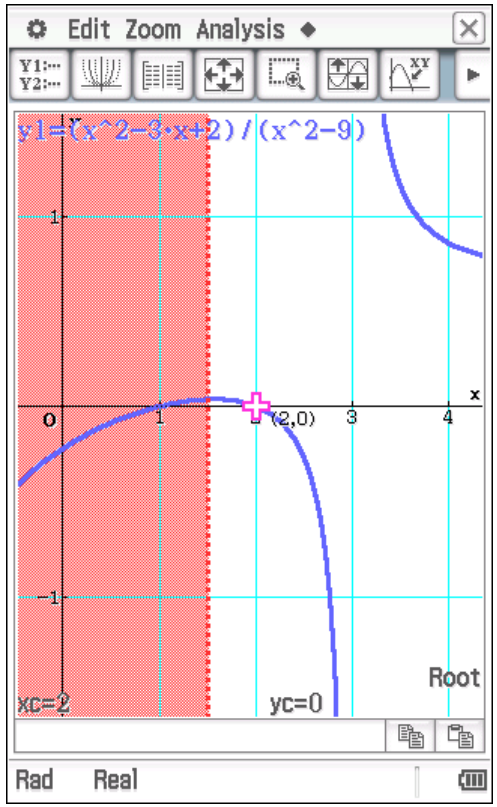
ответ: -1/2

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

1. РАЦИОНАЛНЫЕ НЕРАВЕНСТВА



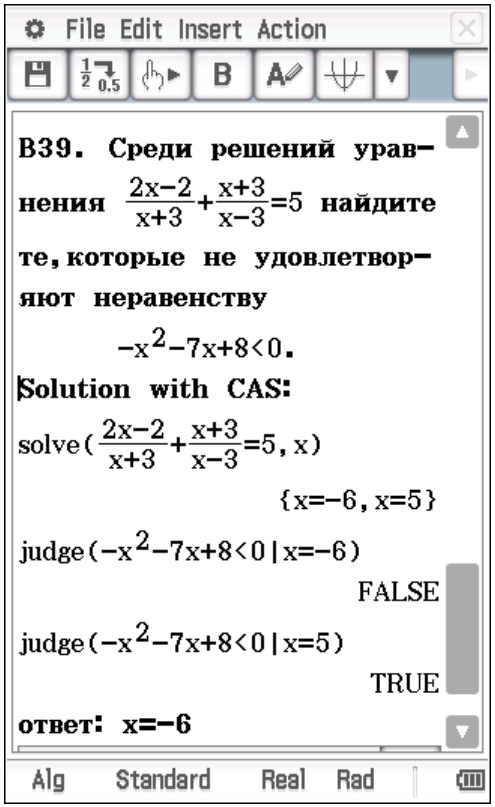


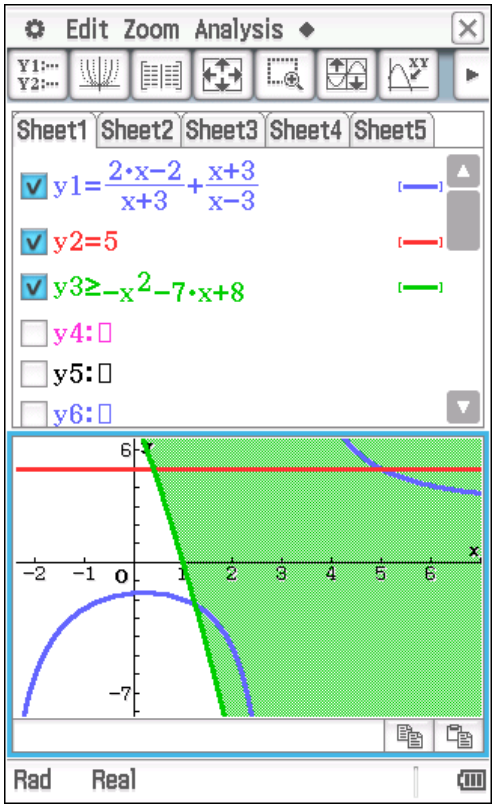


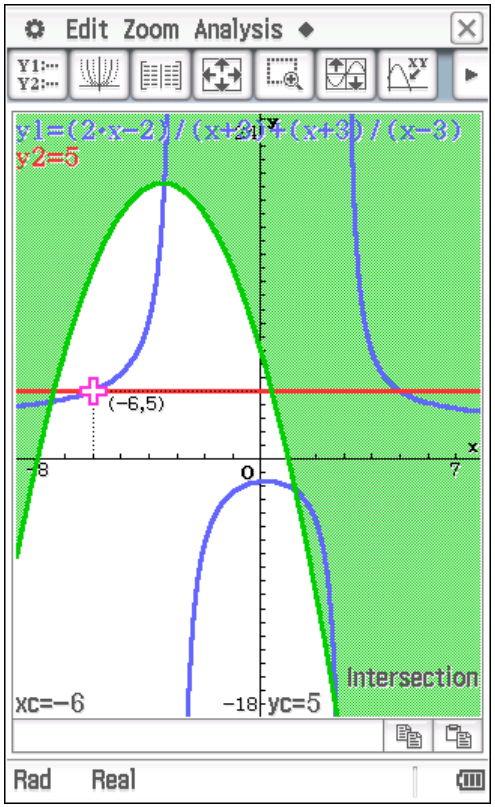
ответ: 1

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

1. РАЦИОНАЛНЫЕ НЕРАВЕНСТВА



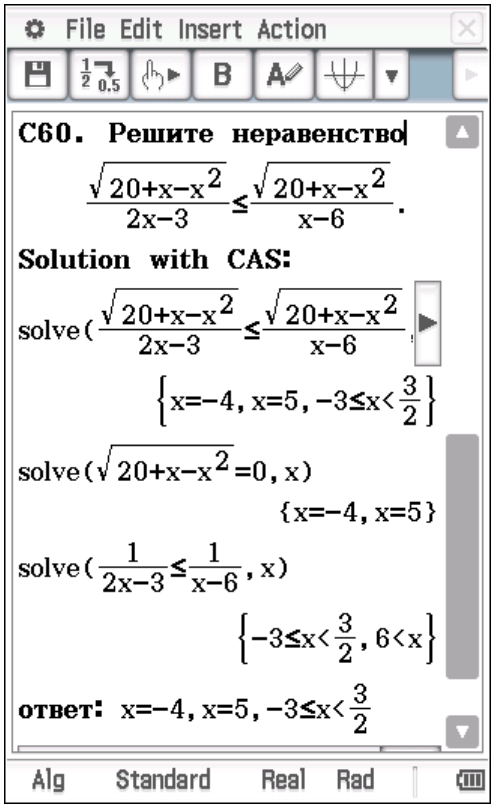


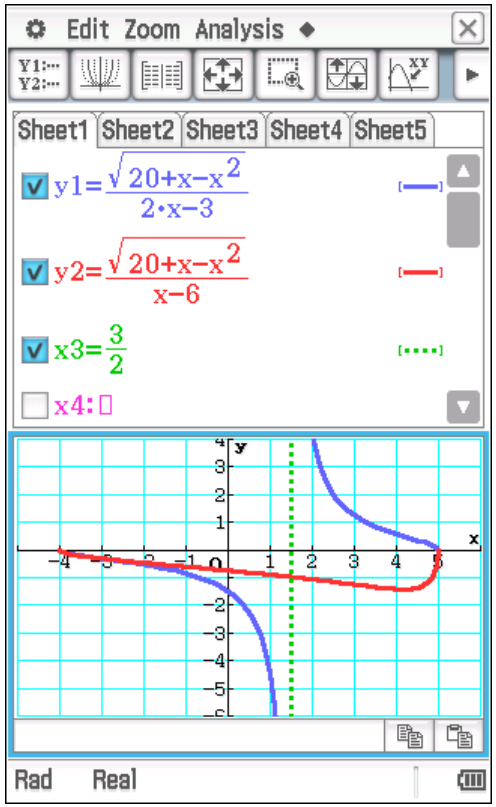


ответ: -6

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

1. РАЦИОНАЛНЫЕ НЕРАВЕНСТВА

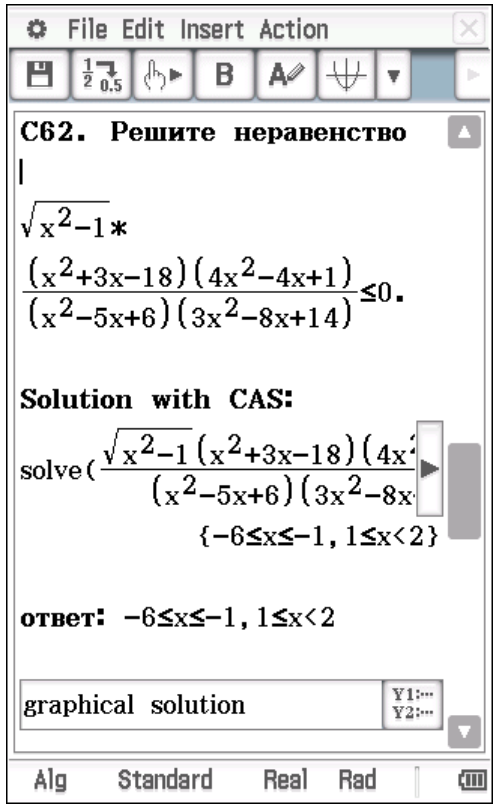


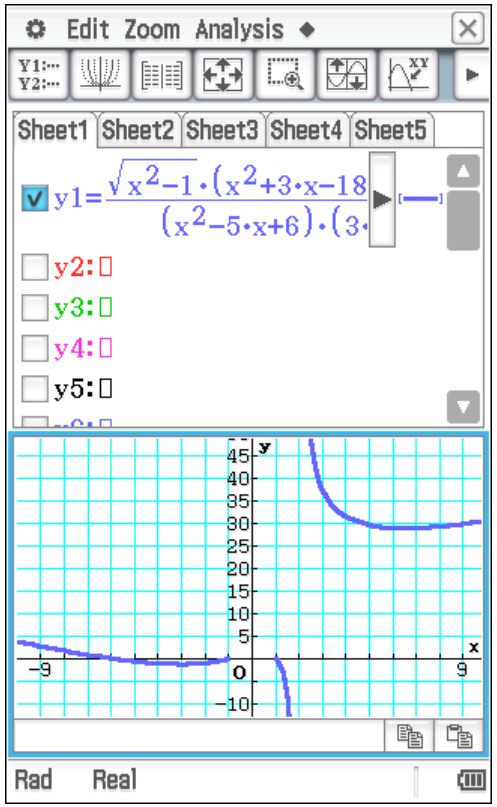


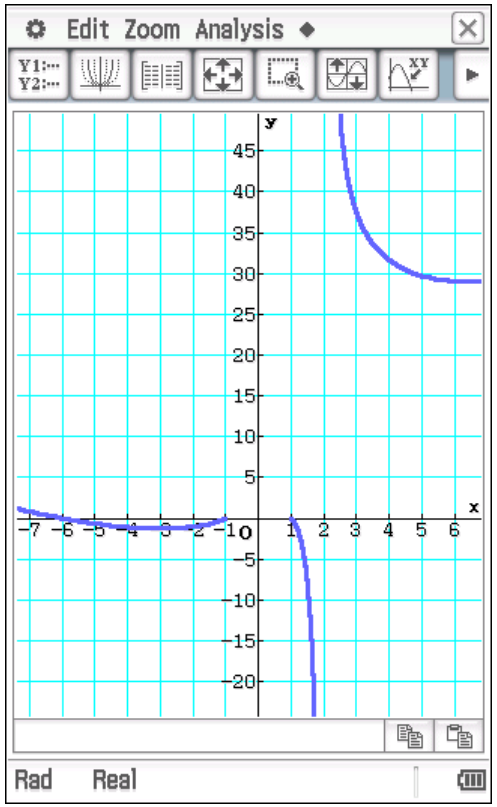
ответ: x=-4, x=5, -3≤x<3/2

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

1. РАЦИОНАЛНЫЕ НЕРАВЕНСТВА



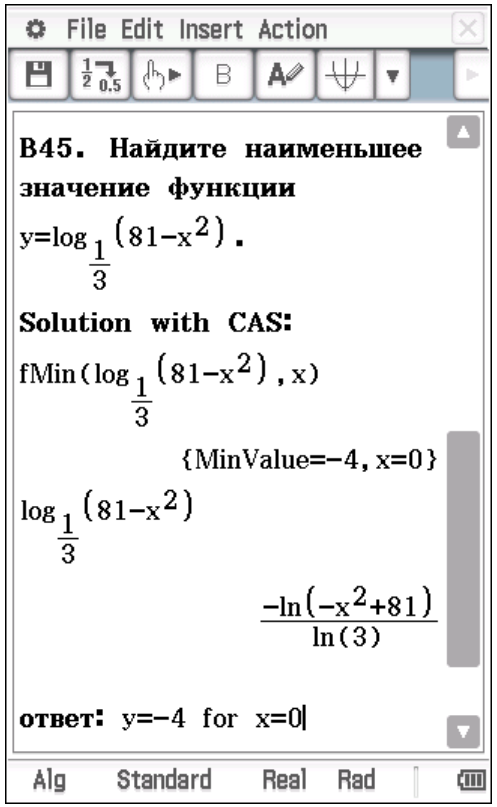


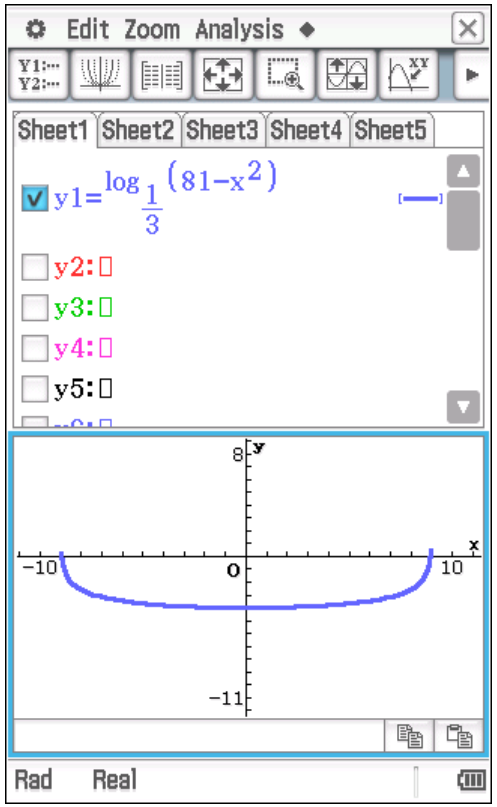


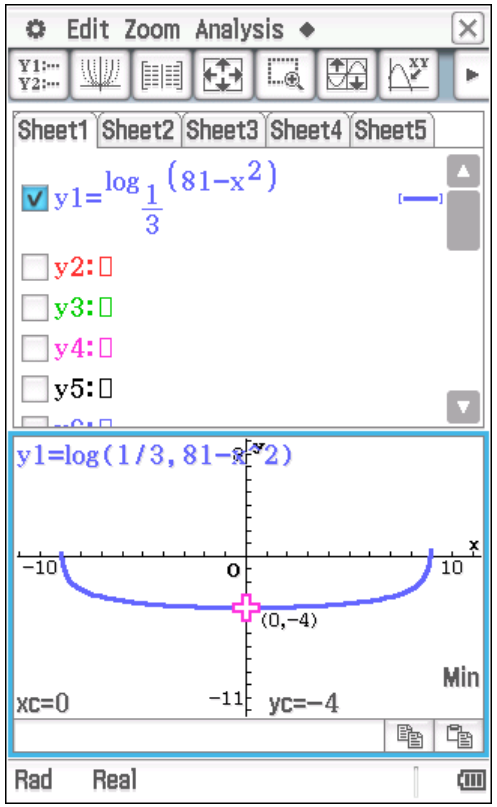
ответ: -6≤x≤-1, 1≤x<2

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

2. ИССЛЕДОВАНИЕ ФУНКЦИЙ ЭЛЕМЕНТАРНЫМИ МЕТОДАМИ



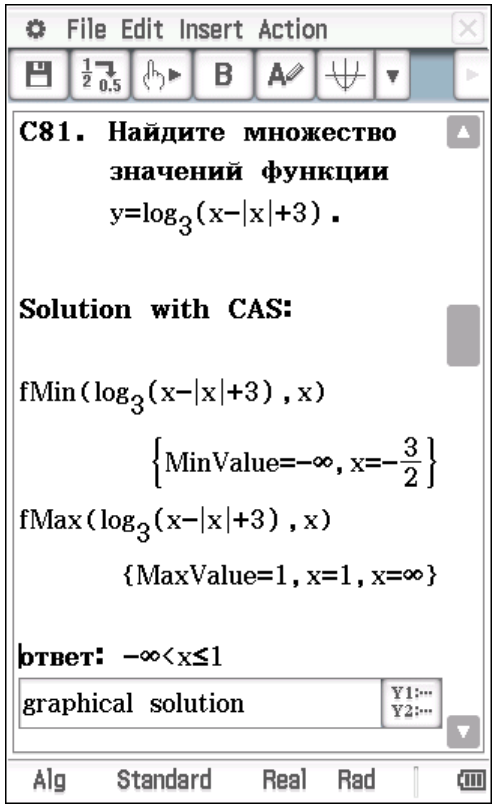


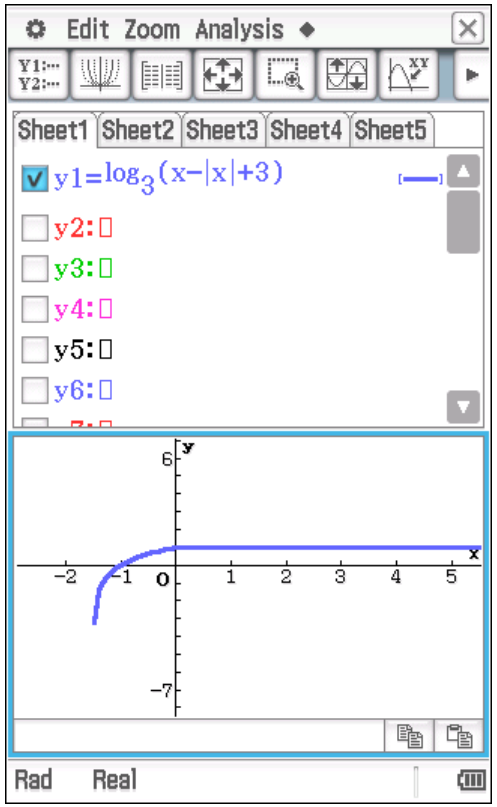


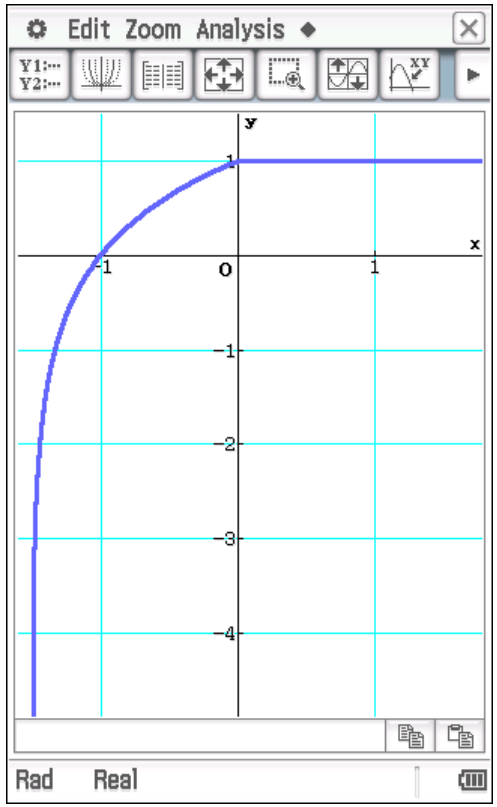
ответ: y=-4 for x=0

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

2. ИССЛЕДОВАНИЕ ФУНКЦИЙ ЭЛЕМЕНТАРНЫМИ МЕТОДАМИ



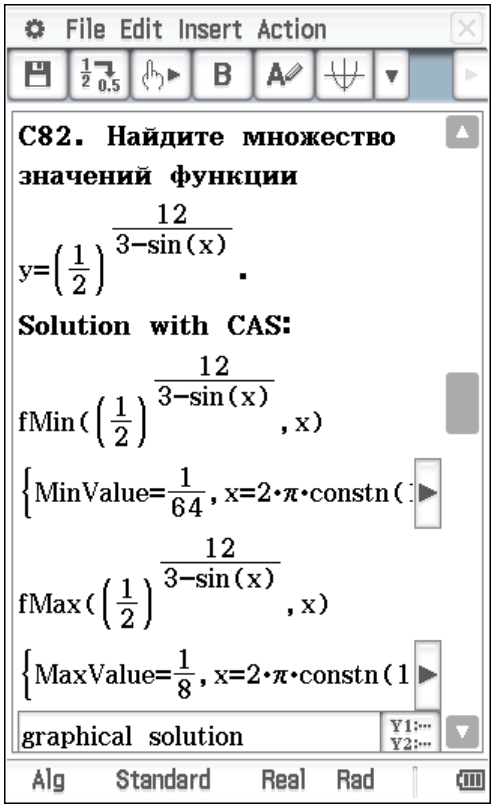


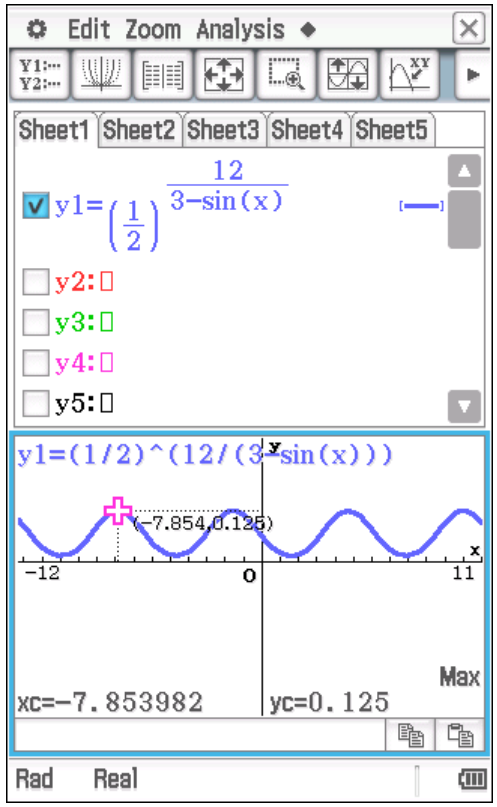


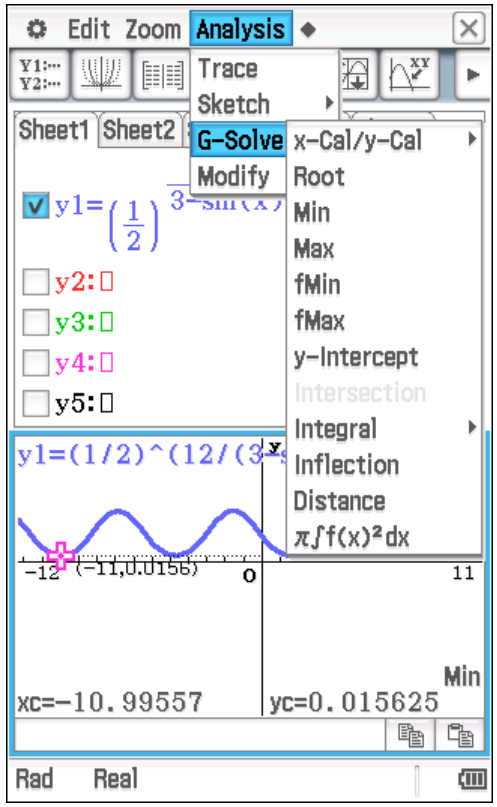
ответ: $-\infty < x \leq 1$

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

2. ИССЛЕДОВАНИЕ ФУНКЦИЙ ЭЛЕМЕНТАРНЫМИ МЕТОДАМИ



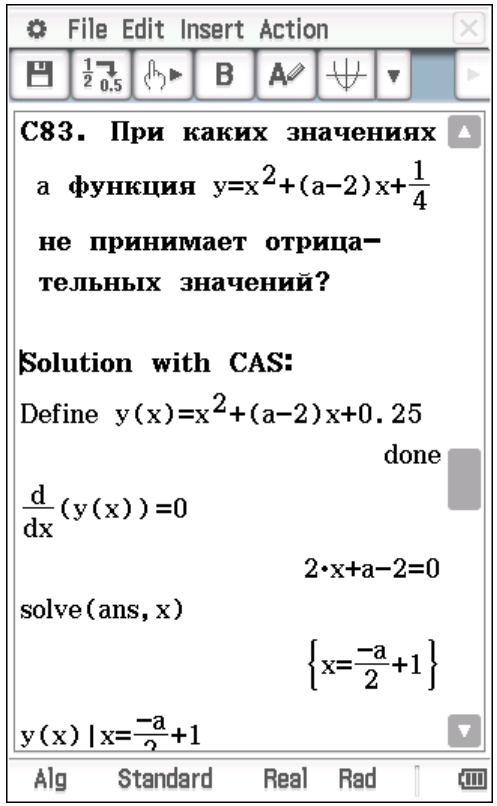


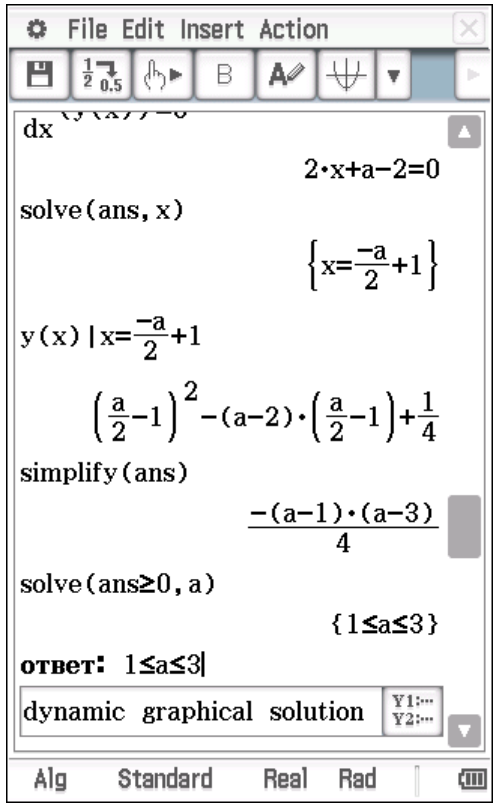


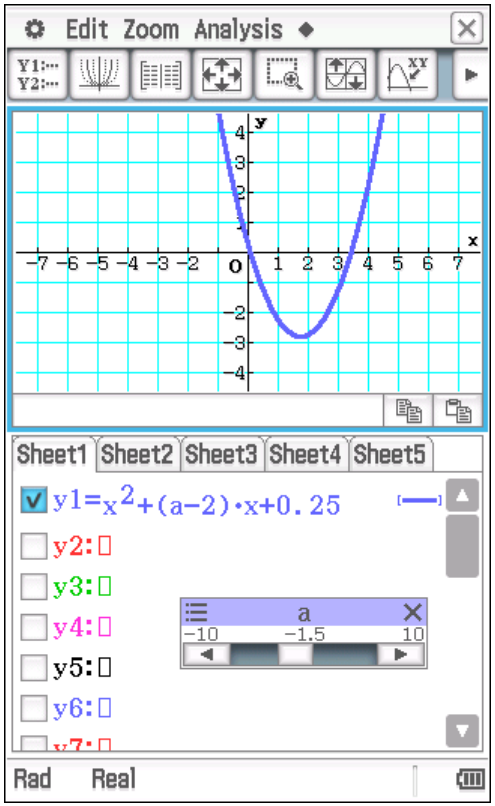
ответ: 1/64 ≤ x ≤ 1/8

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

2. ИССЛЕДОВАНИЕ ФУНКЦИЙ ЭЛЕМЕНТАРНЫМИ МЕТОДАМИ



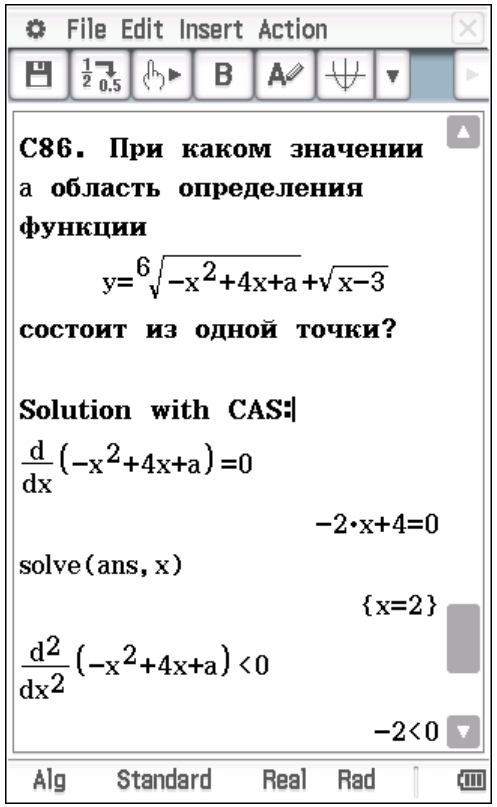


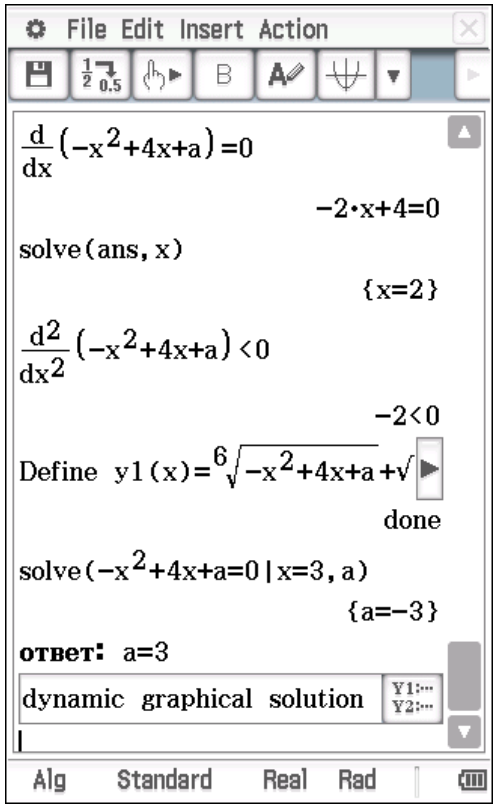


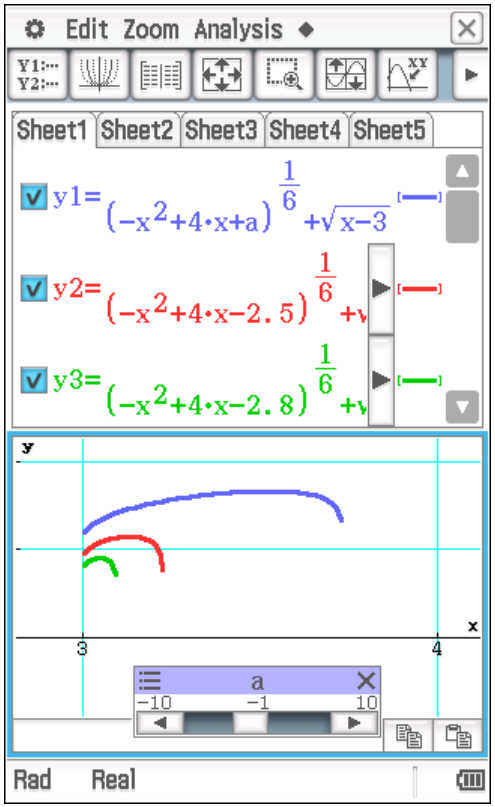
ответ: $1 \le a \le 3$

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

2. ИССЛЕДОВАНИЕ ФУНКЦИЙ ЭЛЕМЕНТАРНЫМИ МЕТОДАМИ



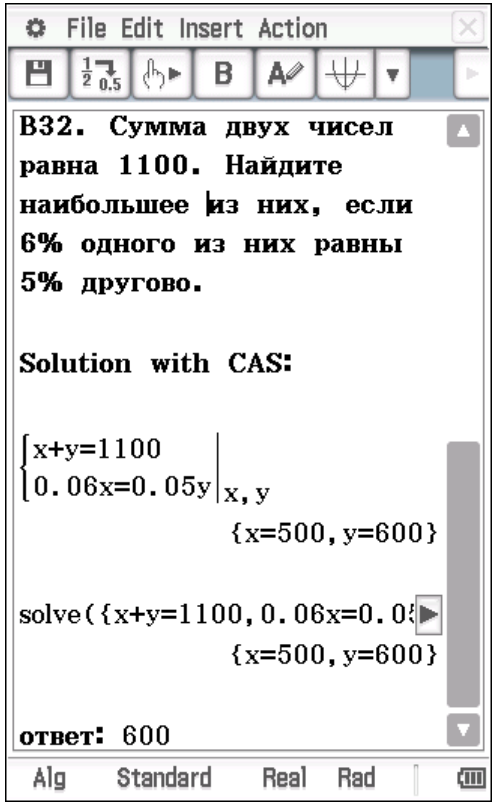




ответ: a = -3

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

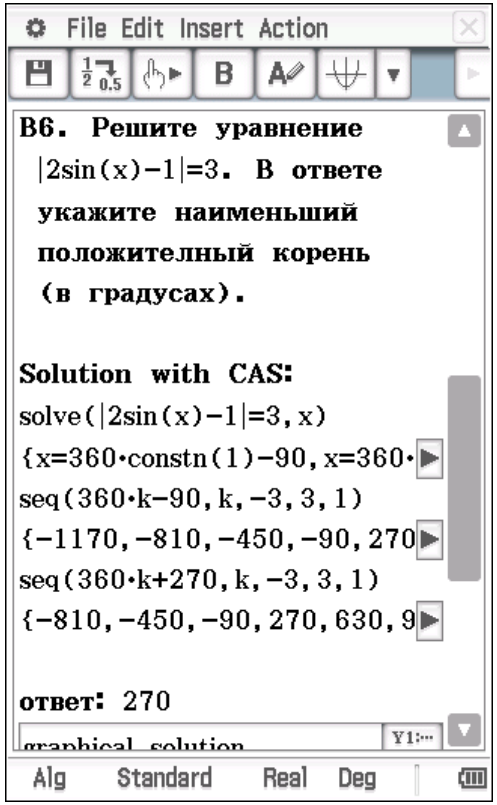
3. ТЕКСТОВЫЕ ЗАДАЧИ

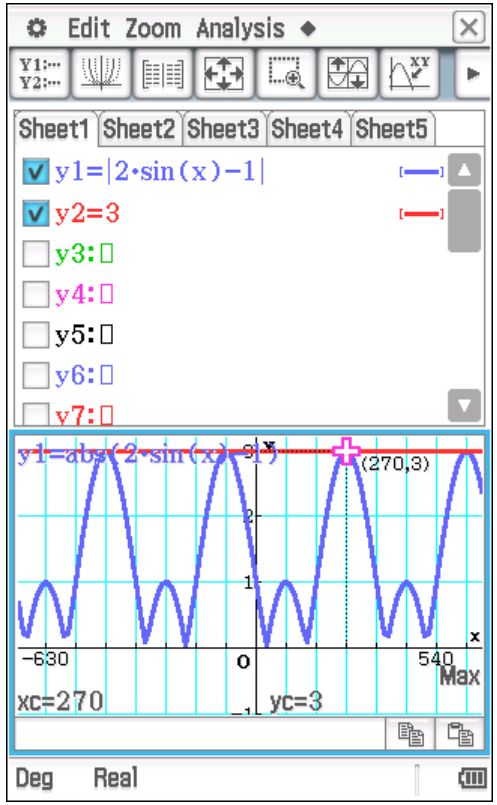


ответ: 600

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ

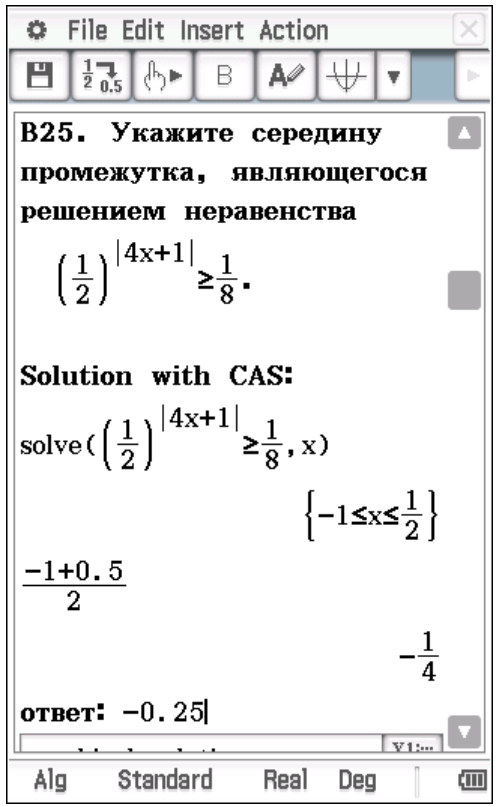


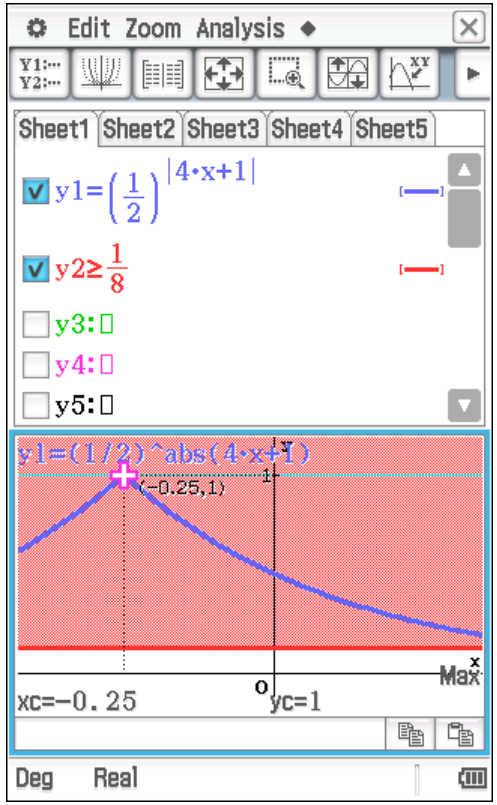


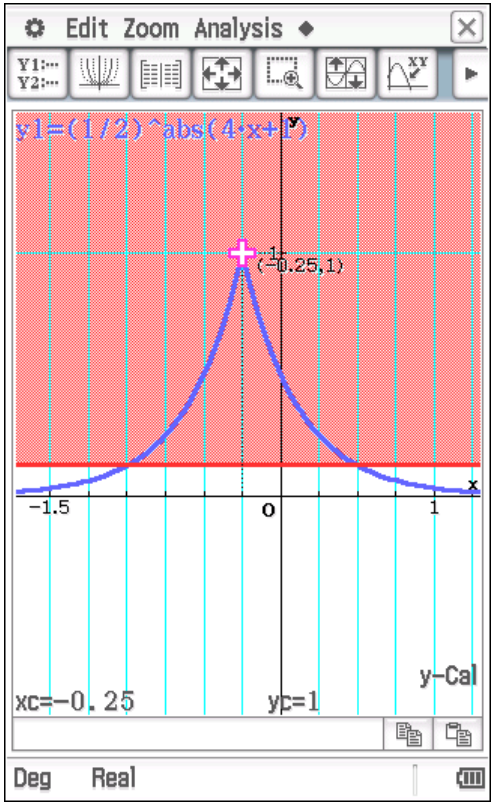
ответ: 270°

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ



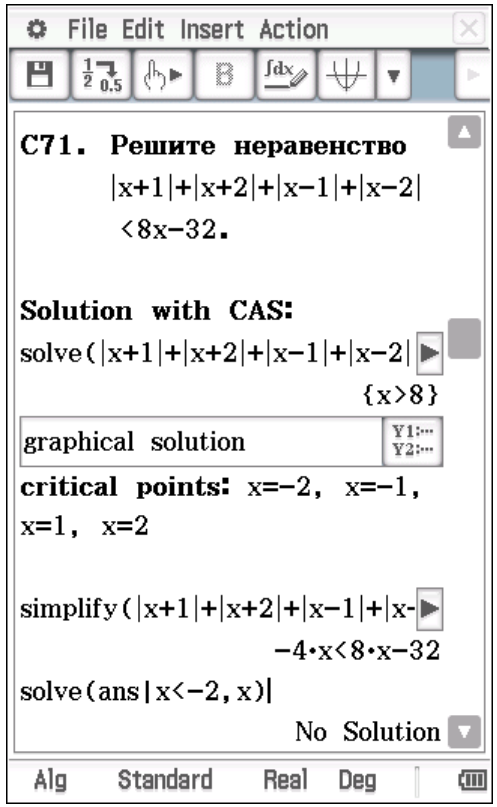


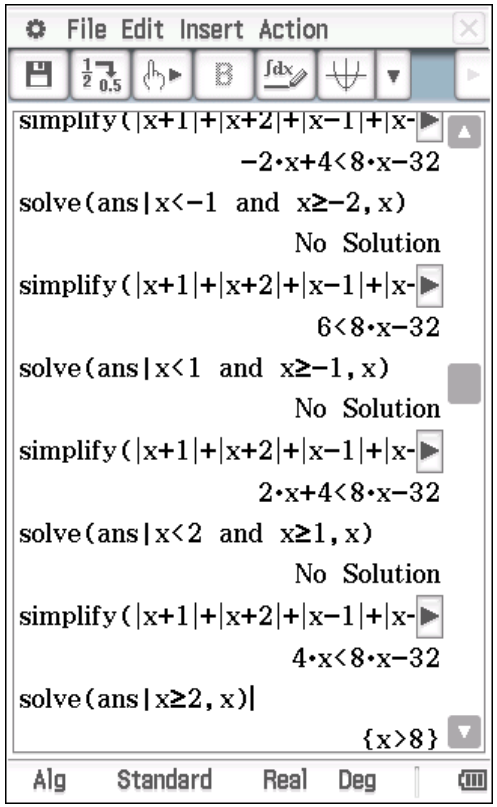


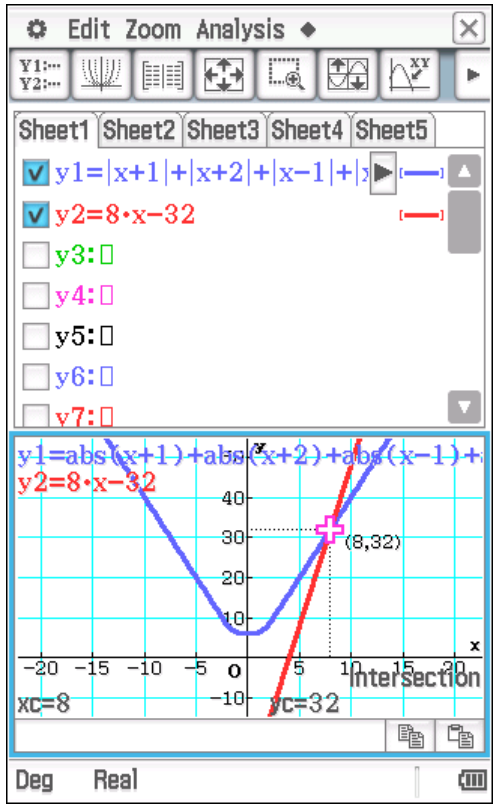
ответ: -0.25

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ



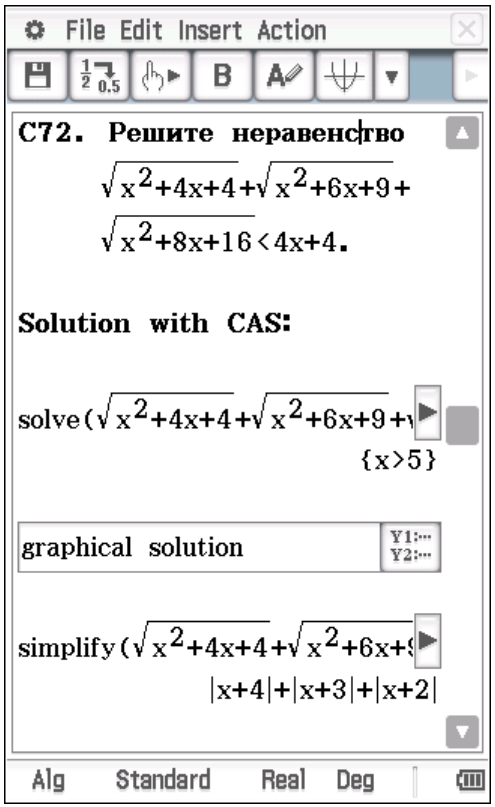


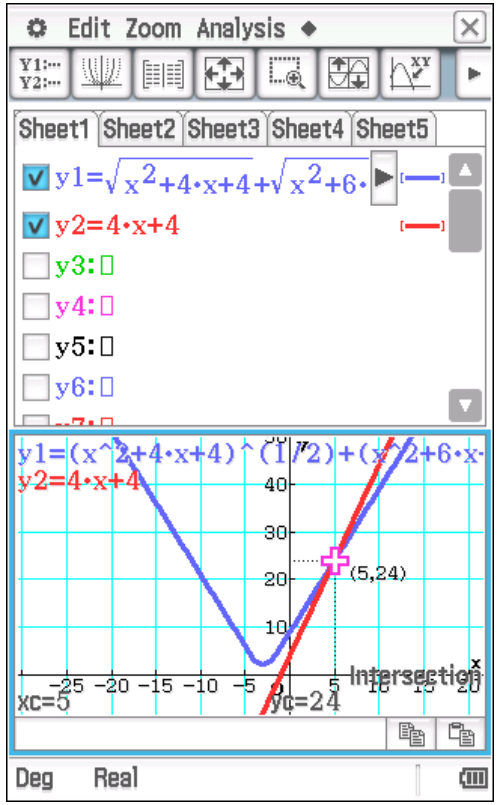


ответ: x>8

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ

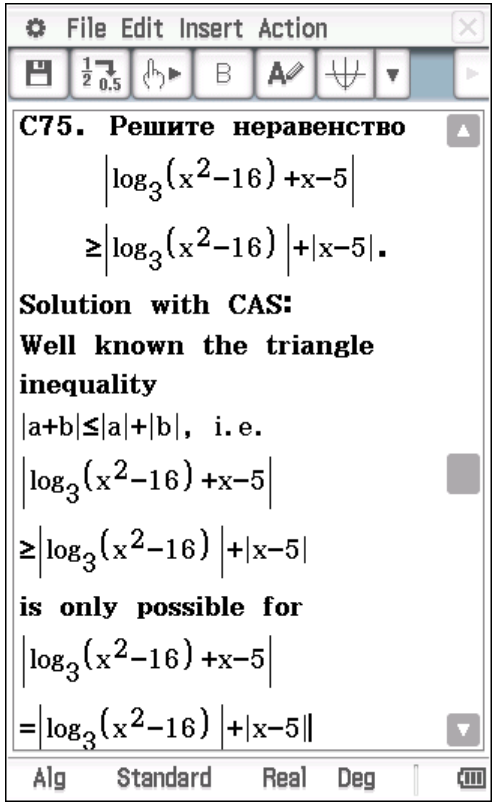


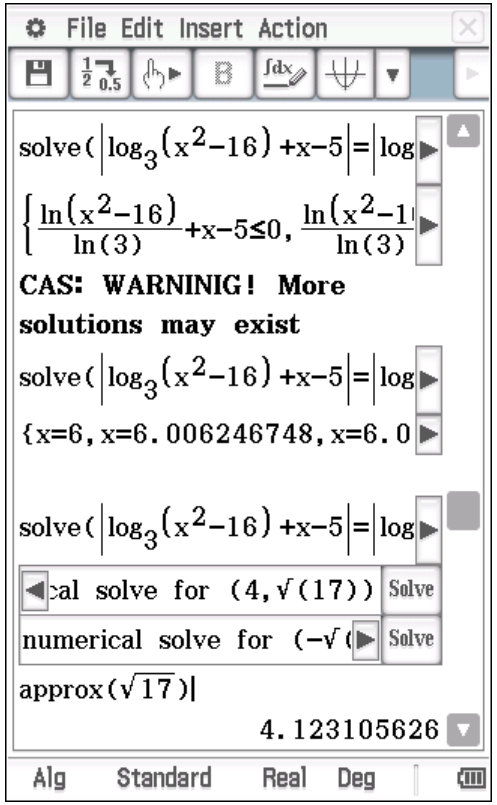


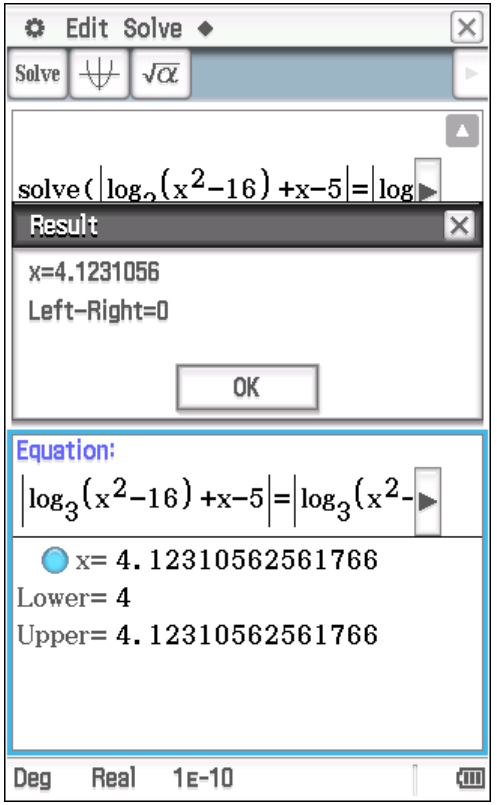
ответ: x>5

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ



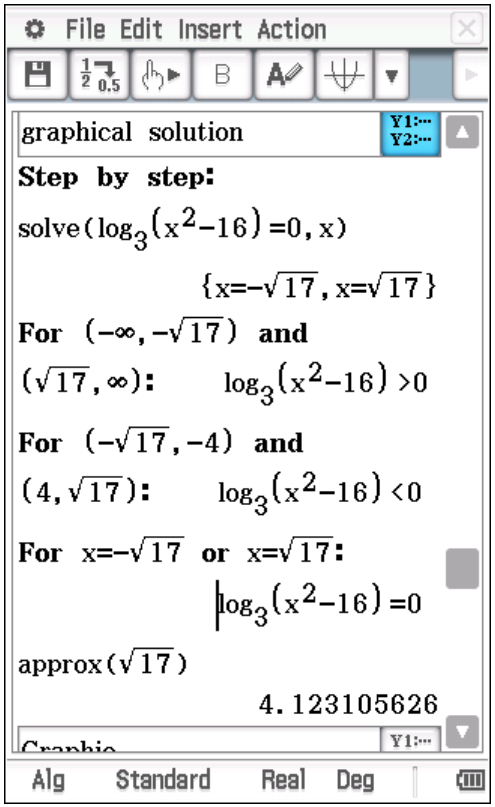


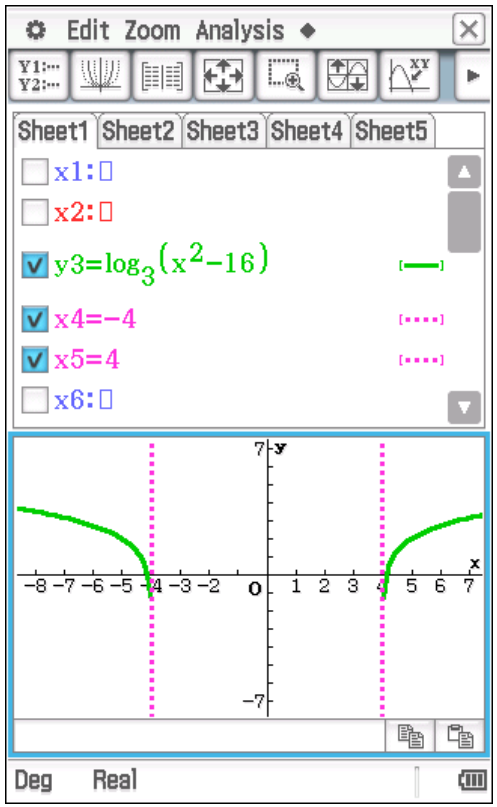


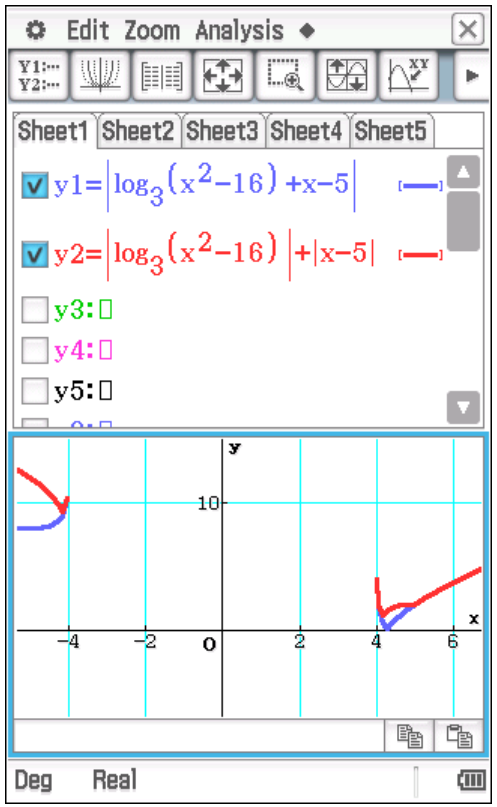
ответ: x ∈ [-√(17), -4) ∪ (4, √(17)] ∪ [5,∞)

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ

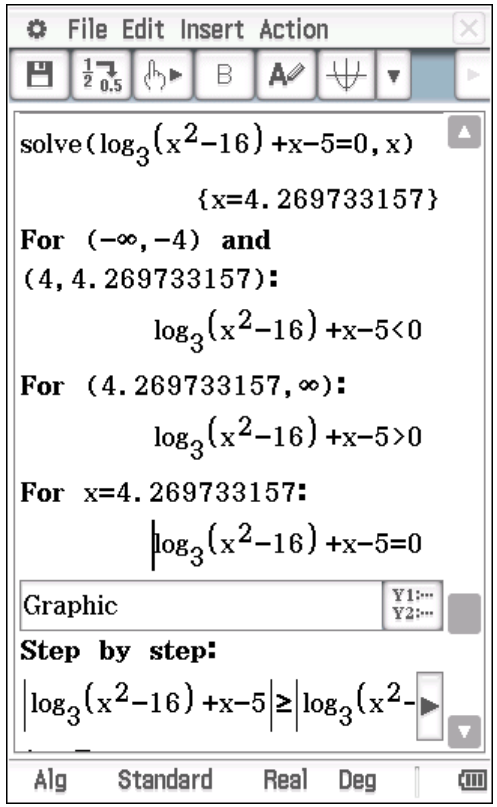


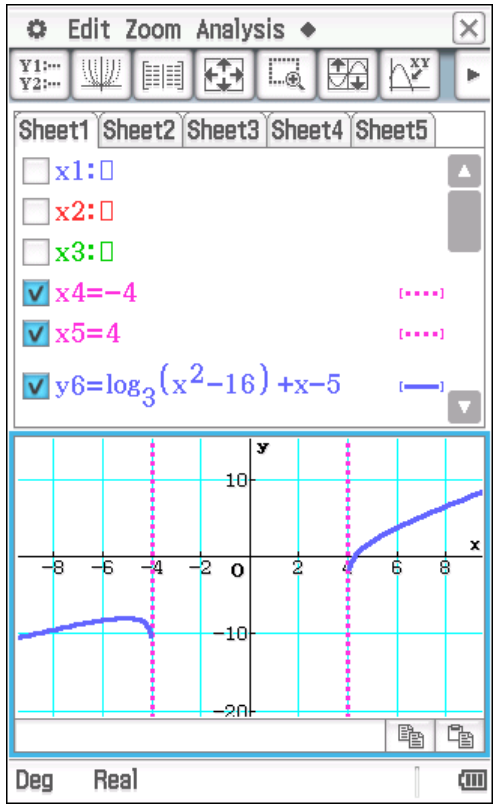


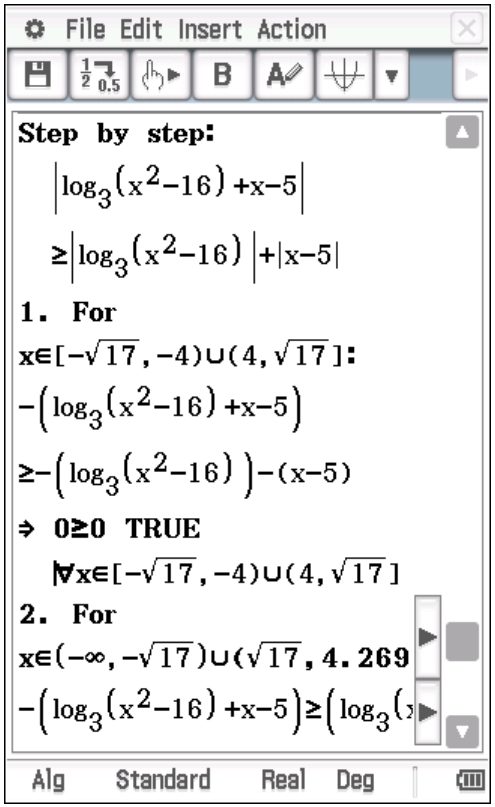


eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

4. УРАВНЕНИЯ И НЕРАВЕНСТВА С МОДУЛЕМ

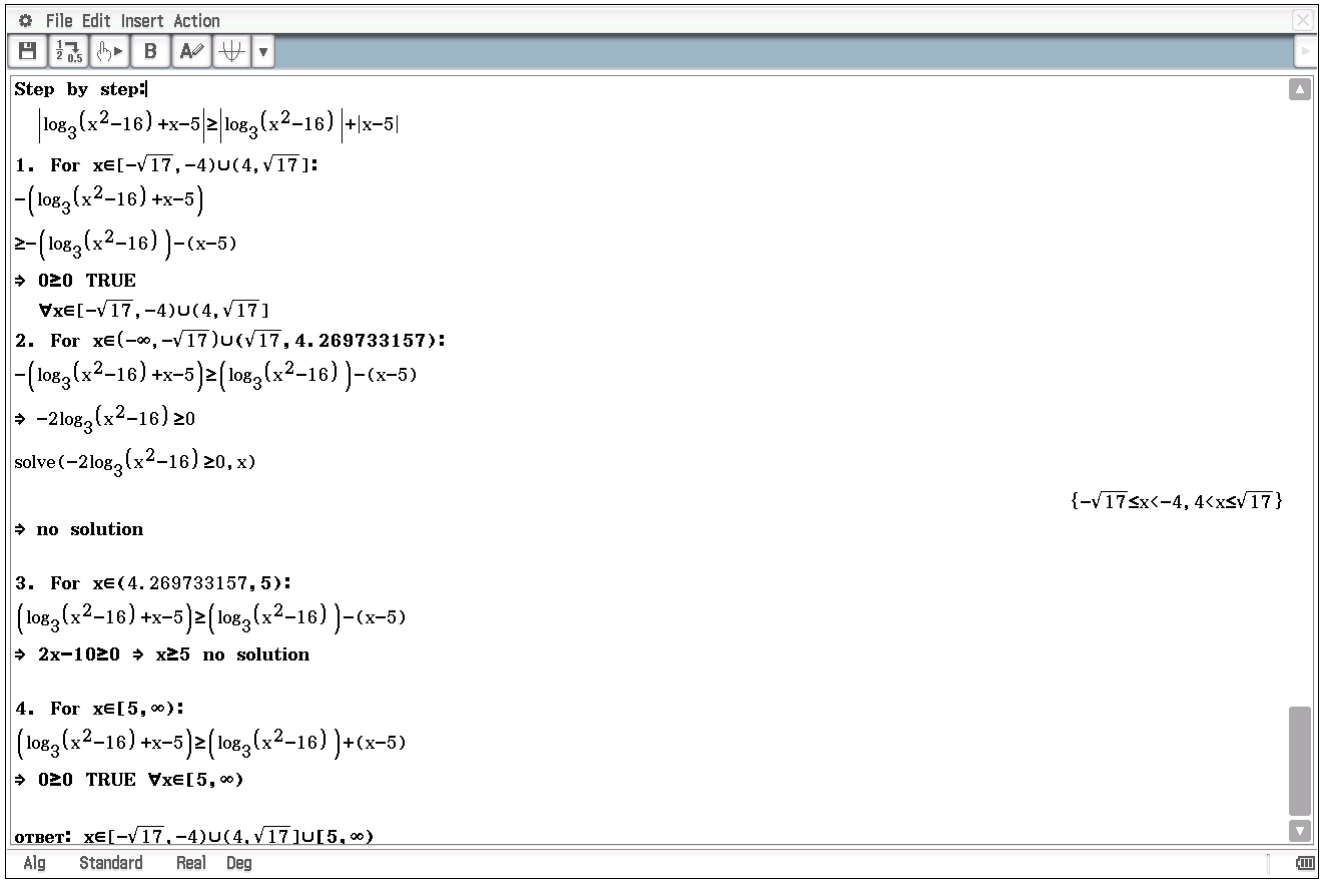






ответ: x ∈ [-√(17), -4) ∪ (4, √(17)] ∪ [5,∞)

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ



ответ: x ∈ [-√(17), -4) ∪ (4, √(17)] ∪ [5,∞)

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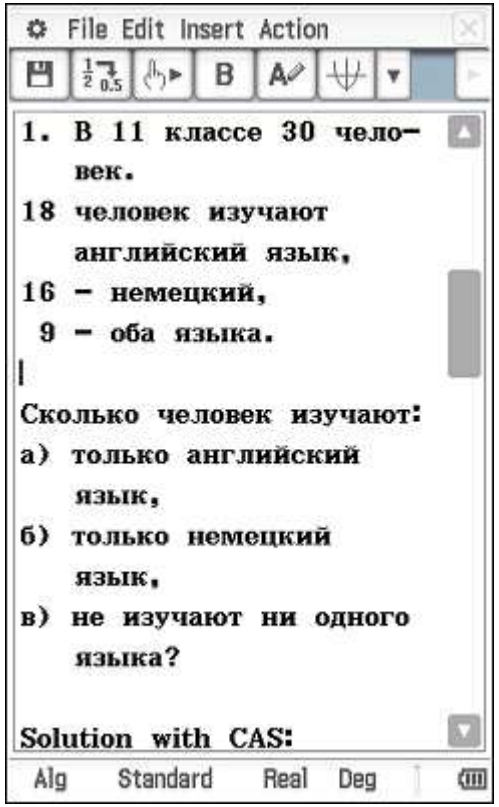
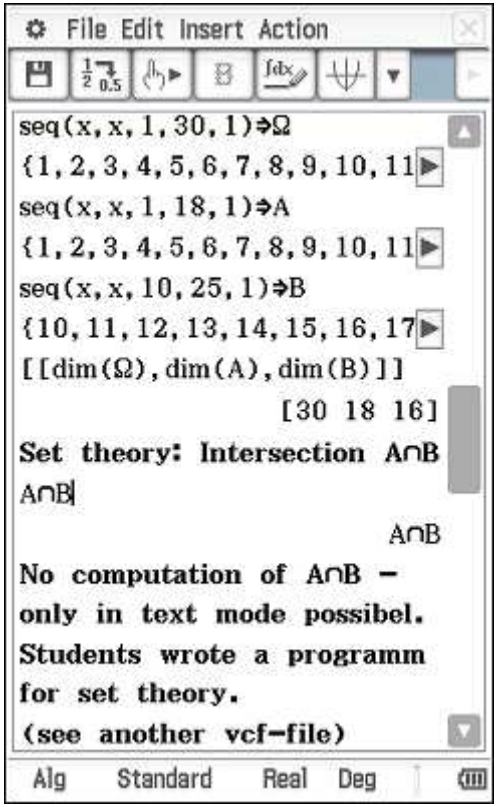
eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

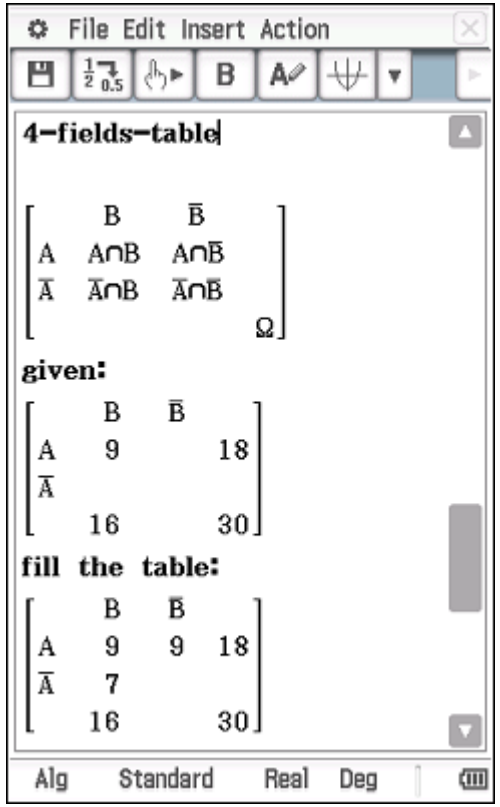
5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ

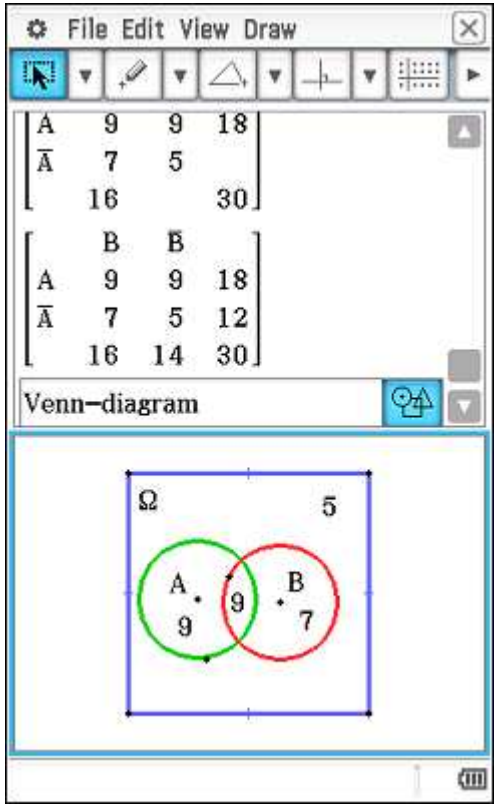




eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ

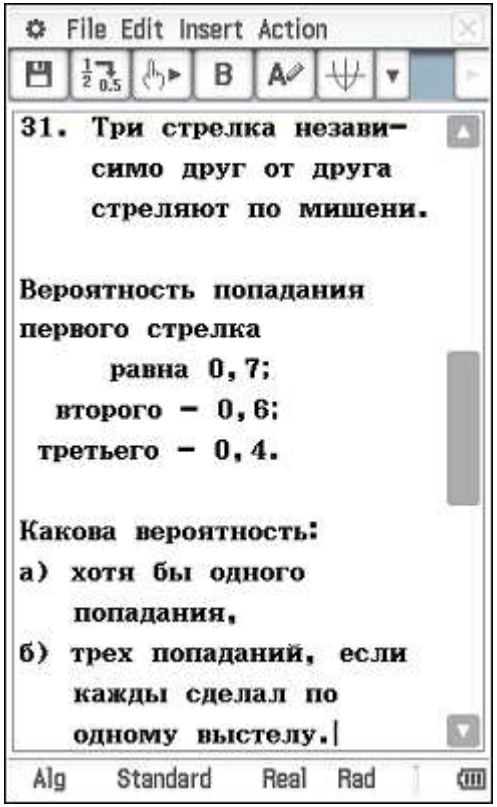


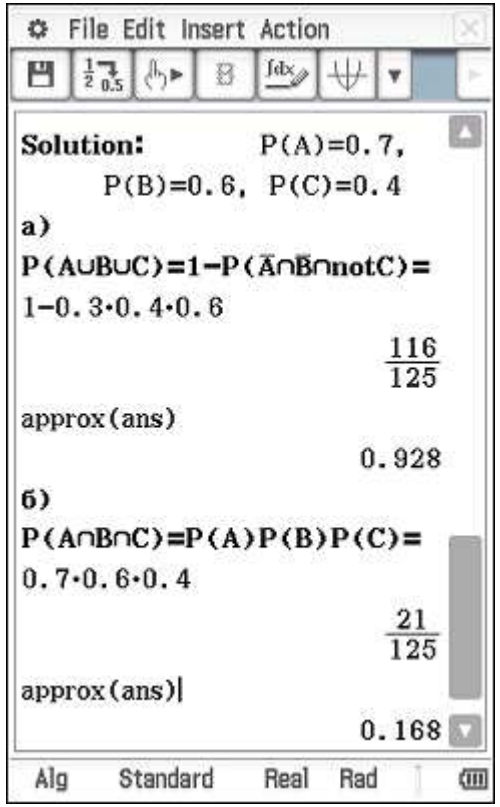


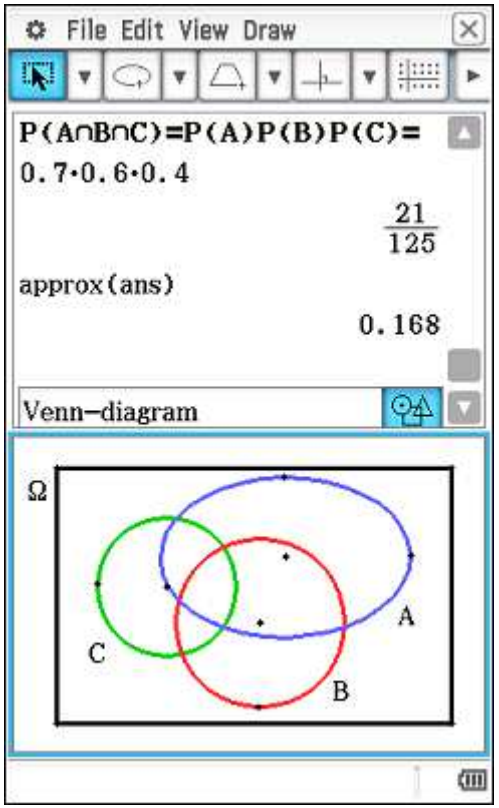
ответ: а)9 б)7 в)5

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ



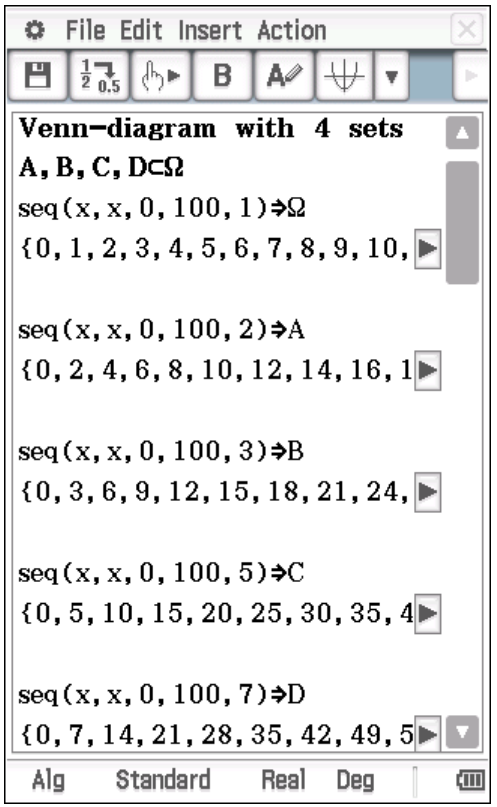


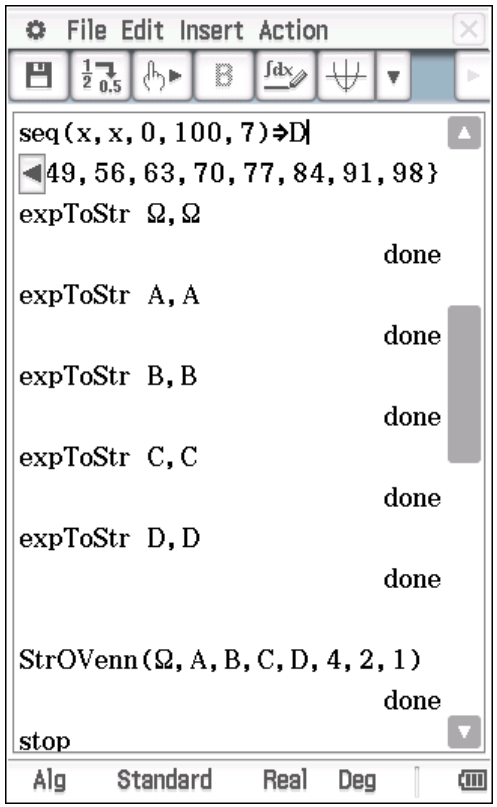


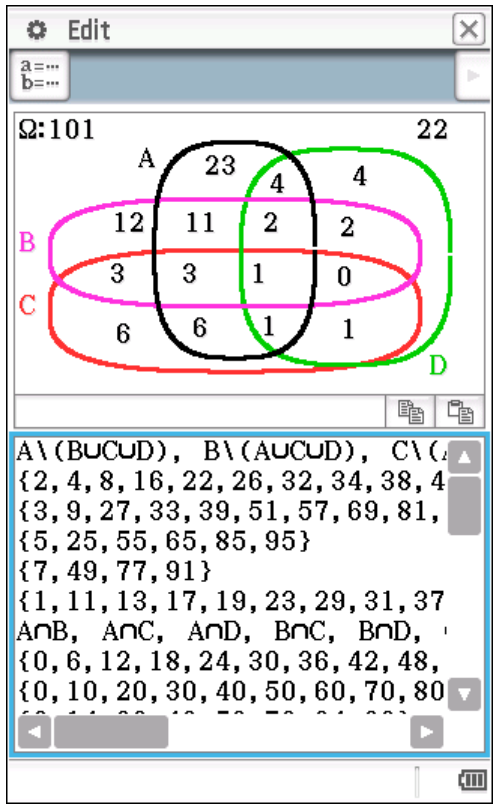
ответ: а)0.928 б)0.168

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ – Venn-diagram with 4 sets A,B,C,D⊂Ω







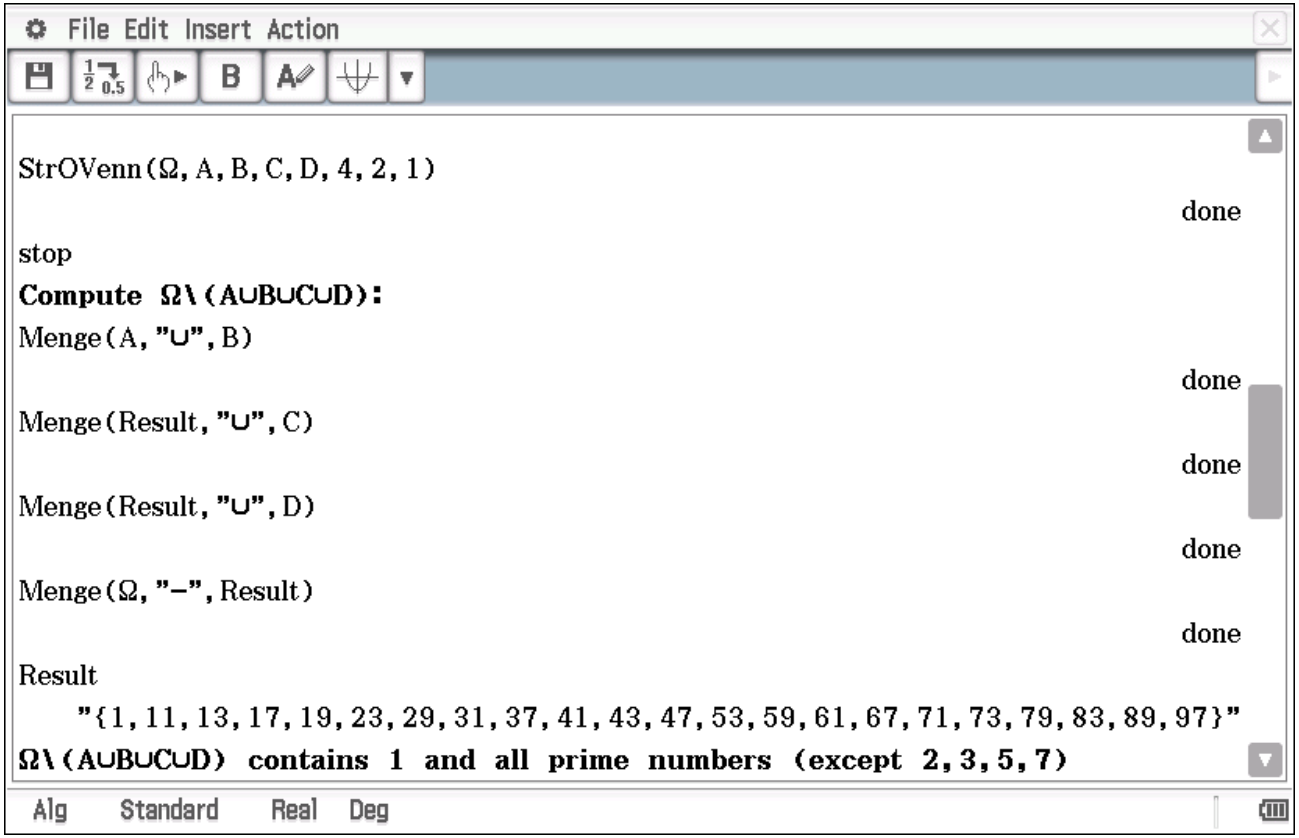
eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ – Venn-diagram with 4 sets A,B,C,D⊂Ω

```
Edit
A\(B∪C∪D), B\(A∪C∪D), C\(A∪B∪D), D\(A∪B∪C), Ω\(A∪B∪C∪D)
{2,4,8,16,22,26,32,34,38,44,46,52,58,62,64,68,74,76,82,86,88,92,94}
{3,9,27,33,39,51,57,69,81,87,93,99}
{5,25,55,65,85,95}
{7,49,77,91}
{1,11,13,17,19,23,29,31,37,41,43,47,53,59,61,67,71,73,79,83,89,97}
A∩B, A∩C, A∩D, B∩C, B∩D, C∩D, A∩B∩C, A∩B∩D, A∩C∩D, B∩C∩D, A∩B∩C∩D
{0,6,12,18,24,30,36,42,48,54,60,66,72,78,84,90,96}
{0,10,20,30,40,50,60,70,80,90,100}
{0,14,28,42,56,70,84,98}
{0,15,30,45,60,75,90}
{0,21,42,63,84}
{0,35,70}
{0,30,60,90}
{0,42,84}
{0,70}
{0}
{0}
(A∩B)\(C∪D), (A∩C)\(B∪D), (A∩D)\(B∪C), (B∩C)\(A∪D), (B∩D)\(A∪C), (C∩D)\(A∪B)
{6,12,18,24,36,48,54,66,72,78,96}
{10,20,40,50,80,100}
{14,28,56,98}
{15,45,75}
{21,63}
{35}
(A∩B∩C)\D,(A∩B∩D)\C,(A∩C∩D)\B,(B∩C∩D)\A
{30,60,90}
{42,84}
{70}
∅
```

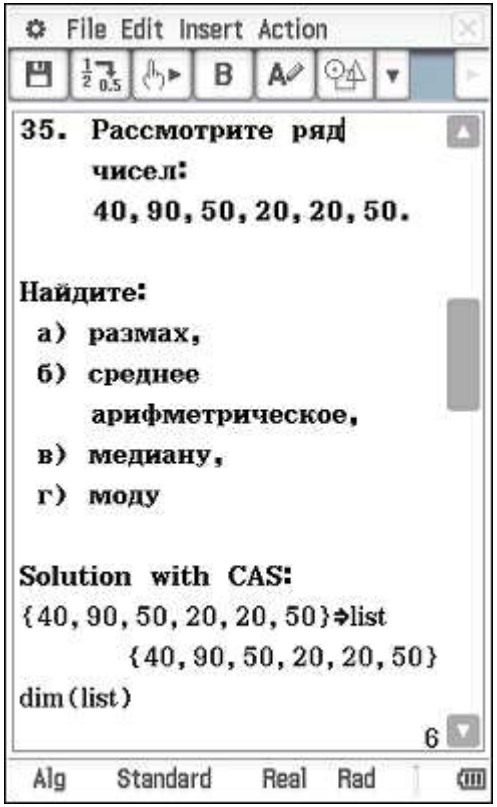
eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

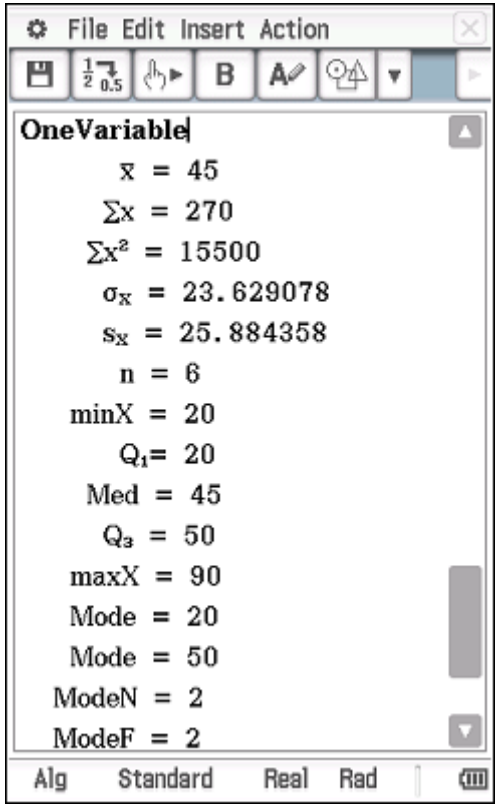
5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ – Compute Ω\(A∪B∪C∪D) with 4 sets A,B,C,D⊂Ω



eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

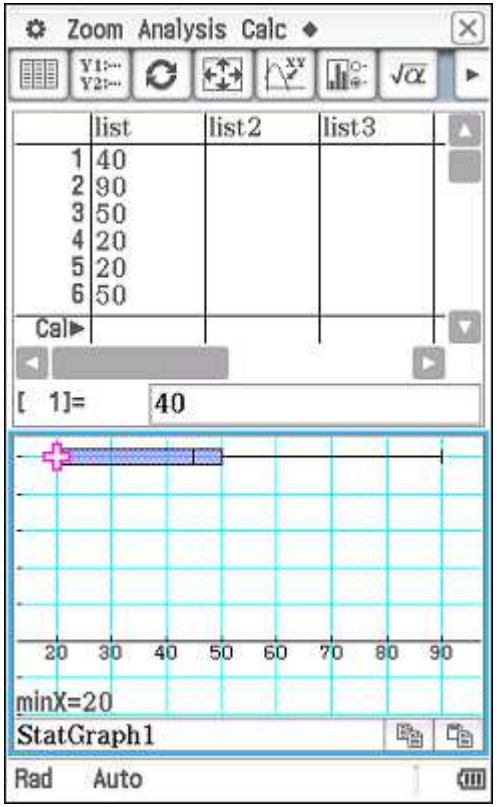
5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ

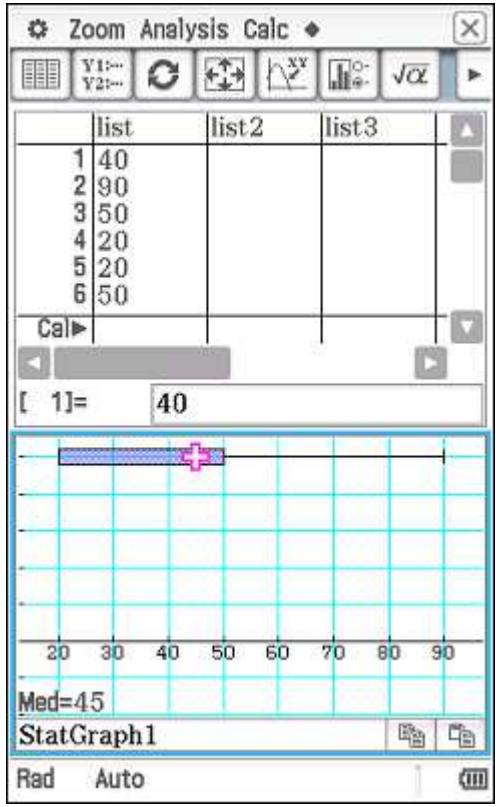


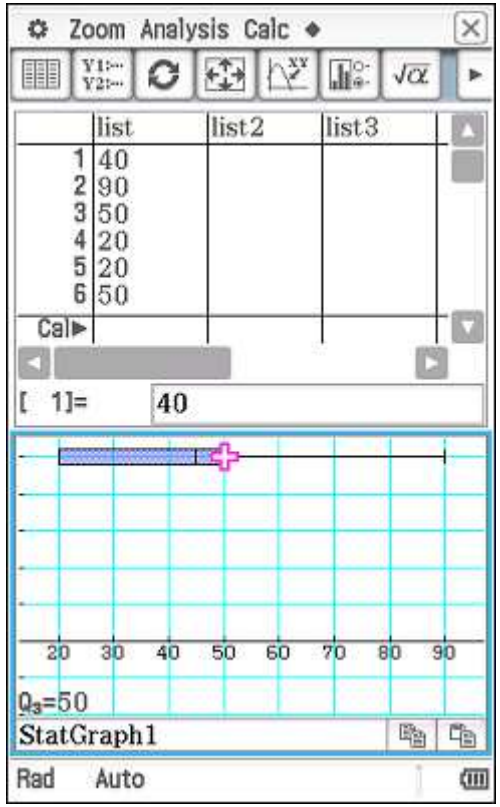


eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ (Boxplot)

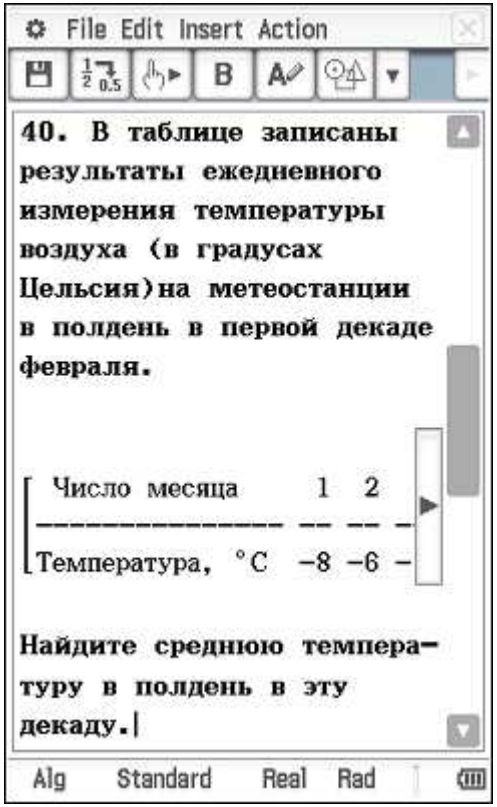


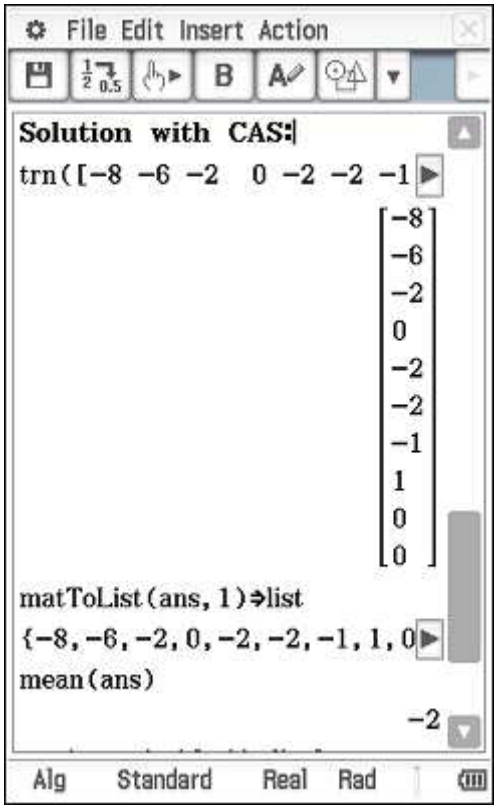




eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ

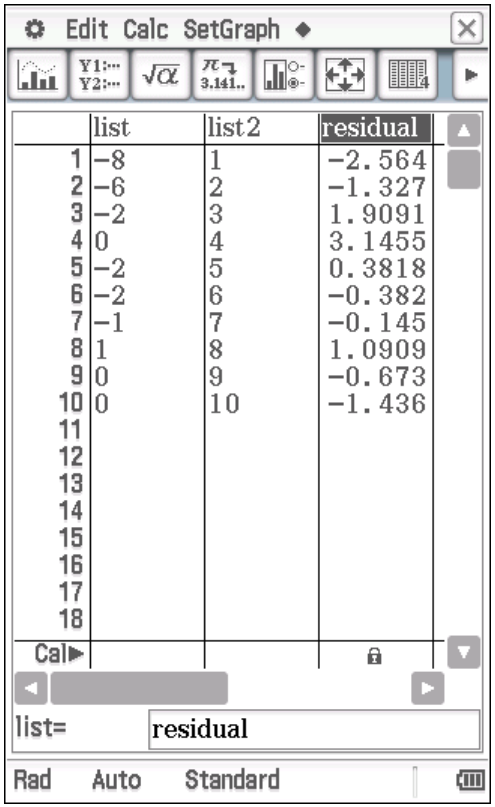


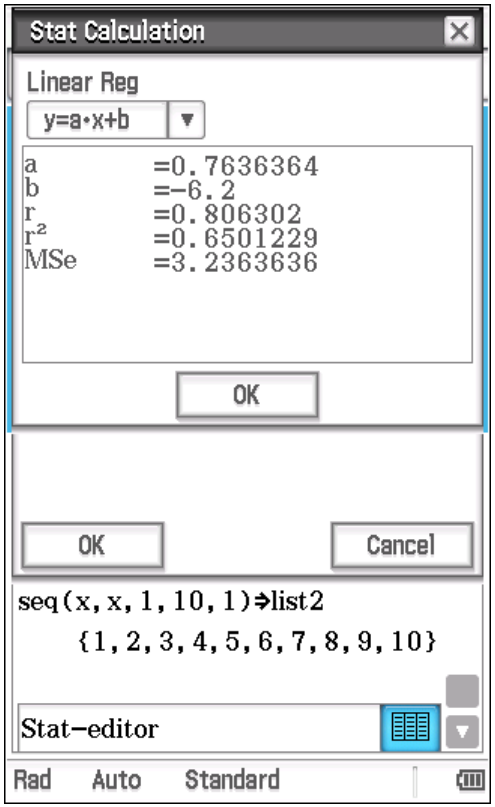


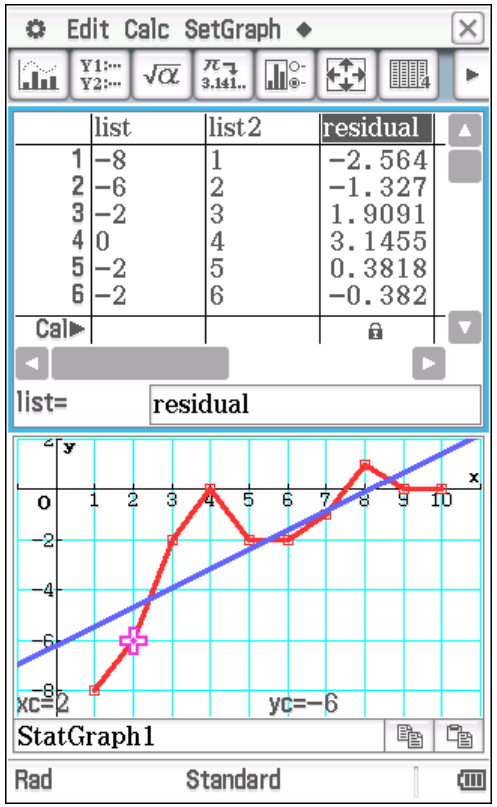
ответ: -2°

eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ

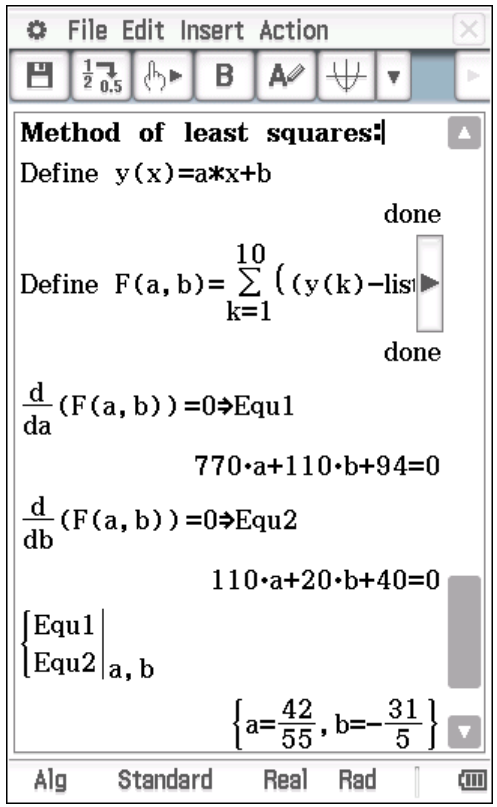


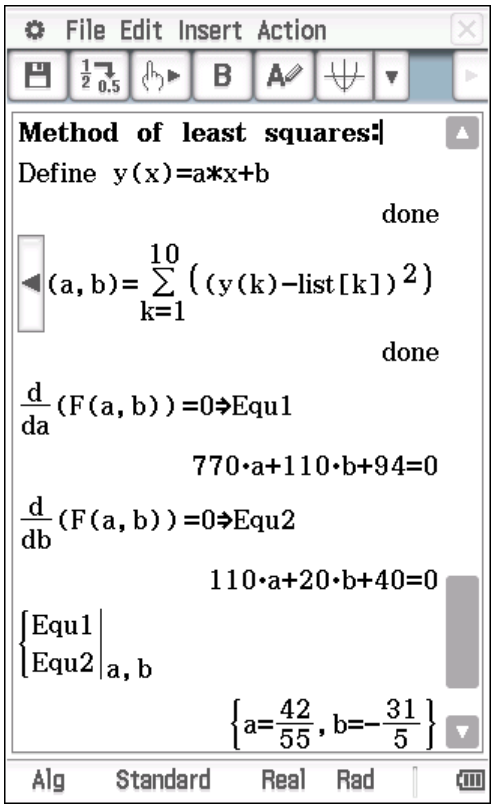


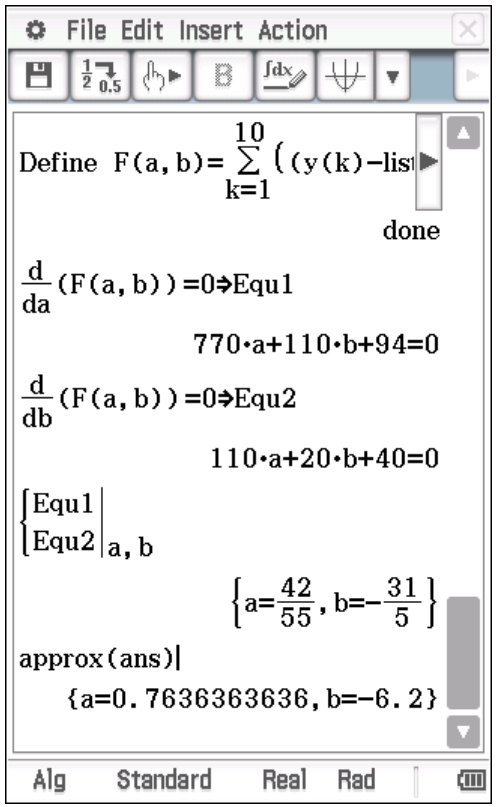


eActivity: II. ТРЕНИРОВОЧНЫЕ ЗАДАНИЯ ИЗ РАЗДЕЛОВ МАТЕМАТИКИ

5. ЭЛЕМЕНТЫ КОМБИНАТОРИКИ,ТЕОРИИ ВЕРОЯТНОСТЕЙ И СТАТИСТИКИ







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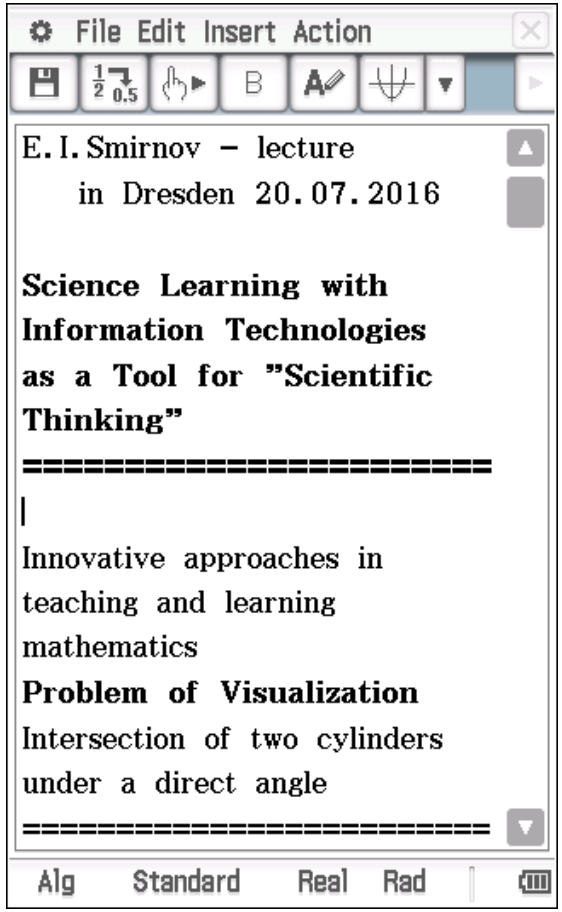
eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

Science Learning with Information Technologies as a Tool for "Scientific Thinking"

Innovative approaches in teaching and learning mathematics

Problem of Visualization

Intersection of two cylinders under a direct angle



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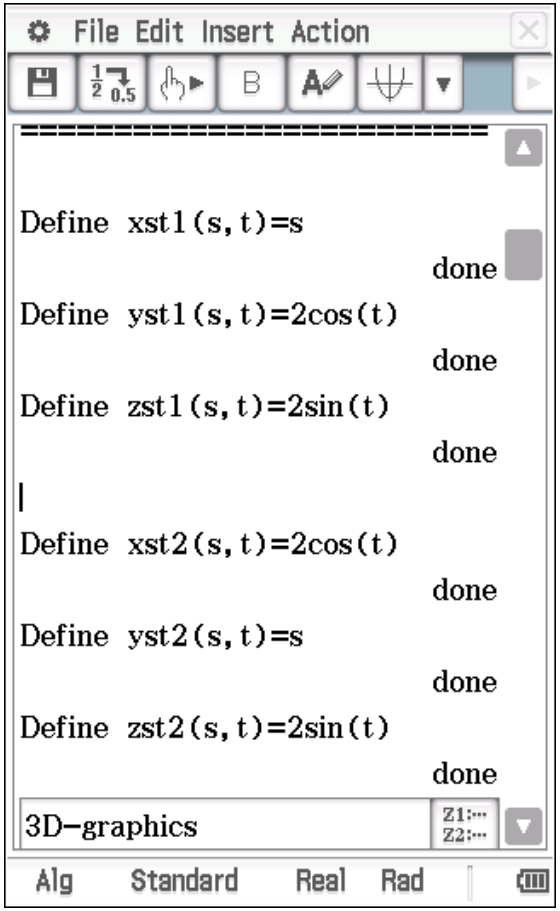

eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

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Innovative approaches in teaching and learning mathematics

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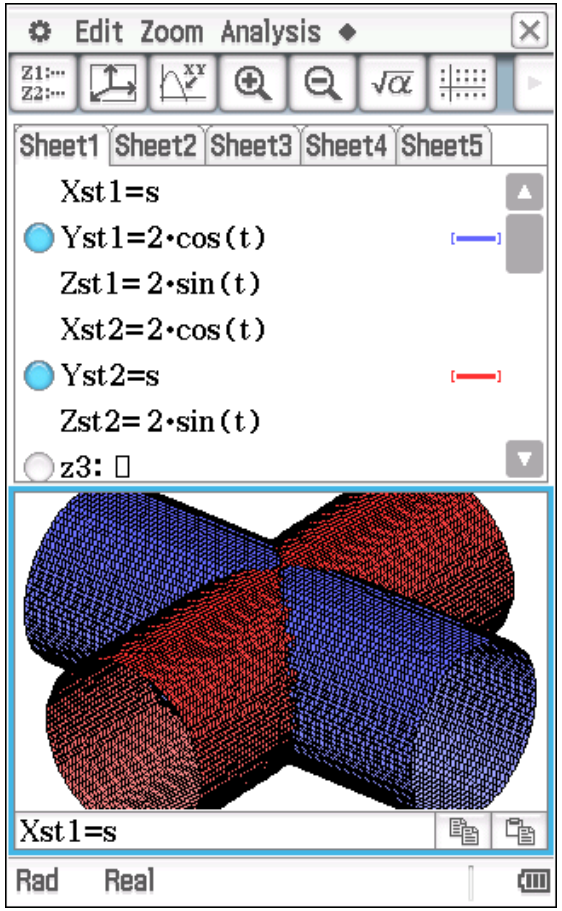

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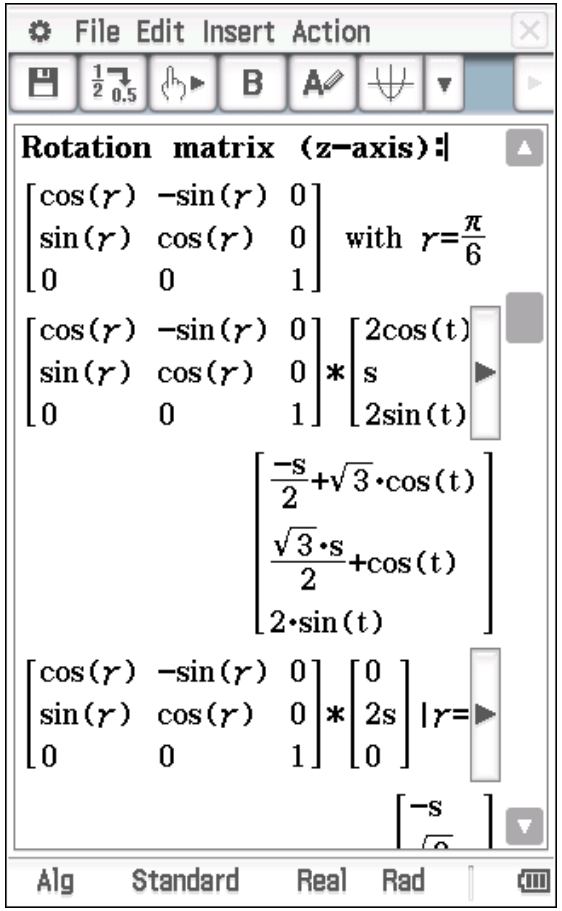
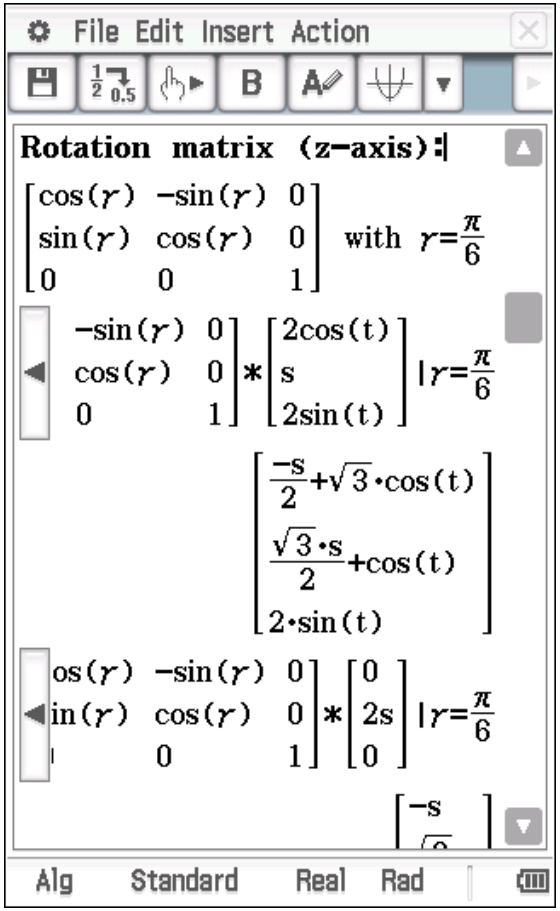
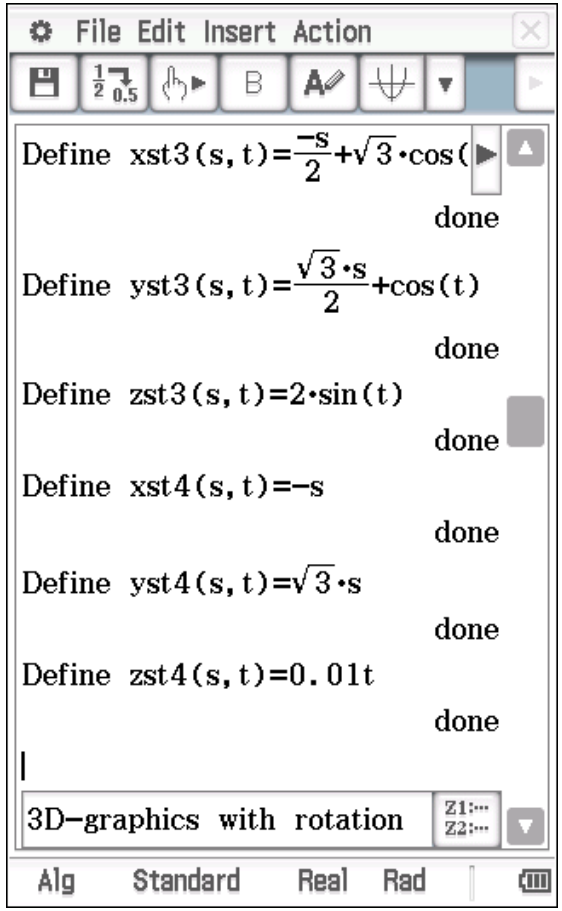
eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

Science Learning with Information Technologies as a Tool for "Scientific Thinking"







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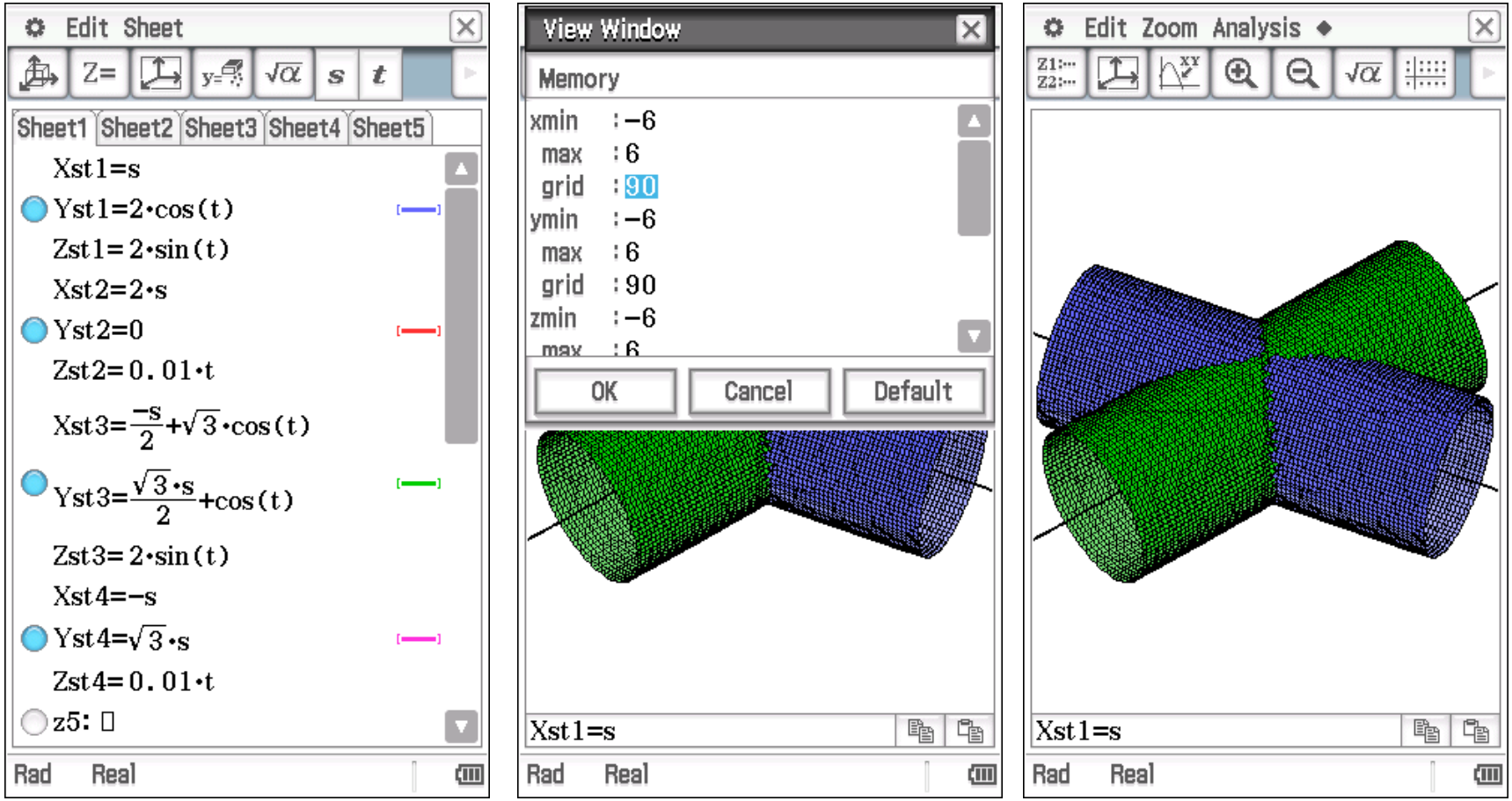
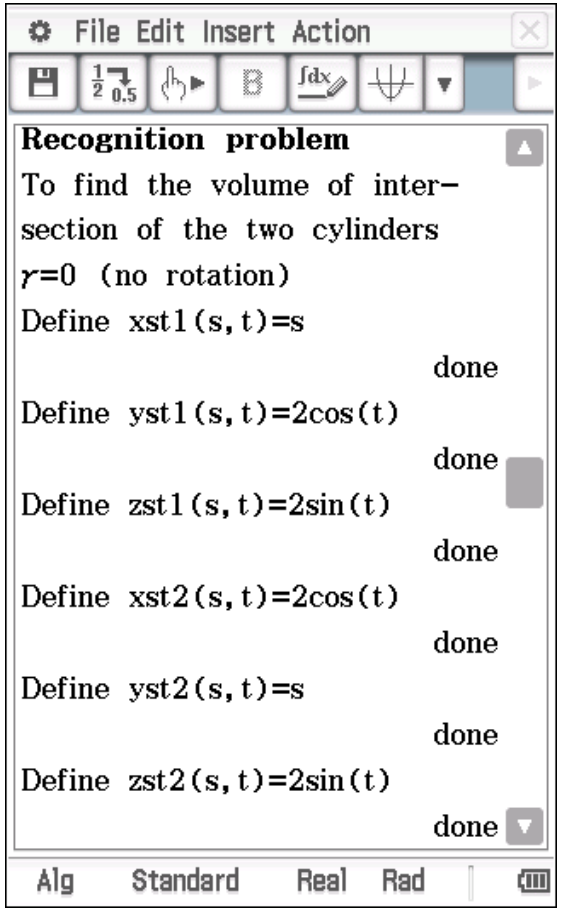
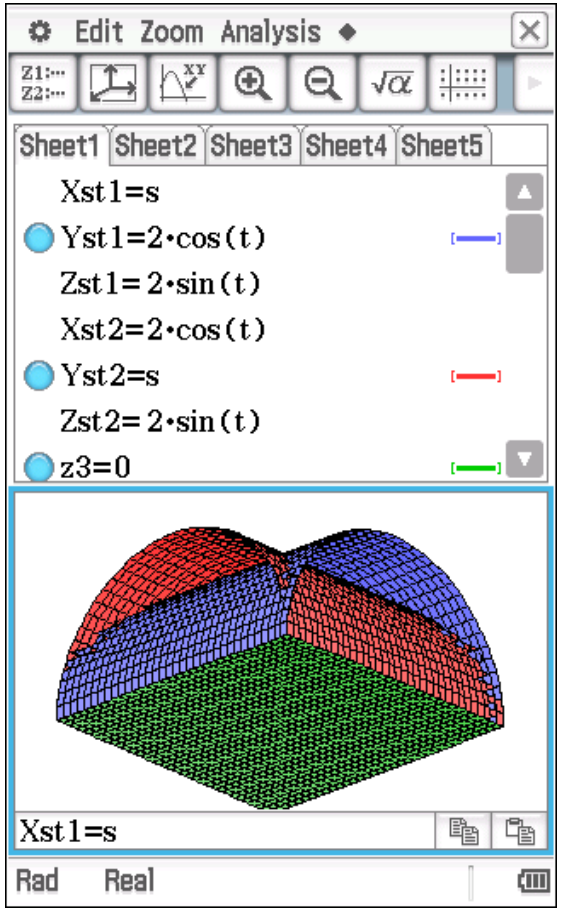
Science Learning with Information Technologies as a Tool for "Scientific Thinking"

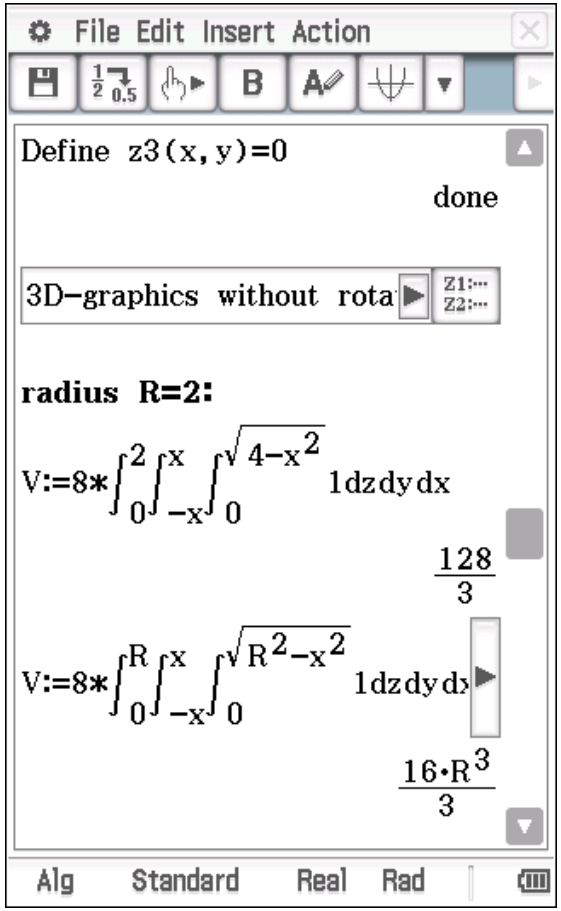


eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

Science Learning with Information Technologies as a Tool for "Scientific Thinking"







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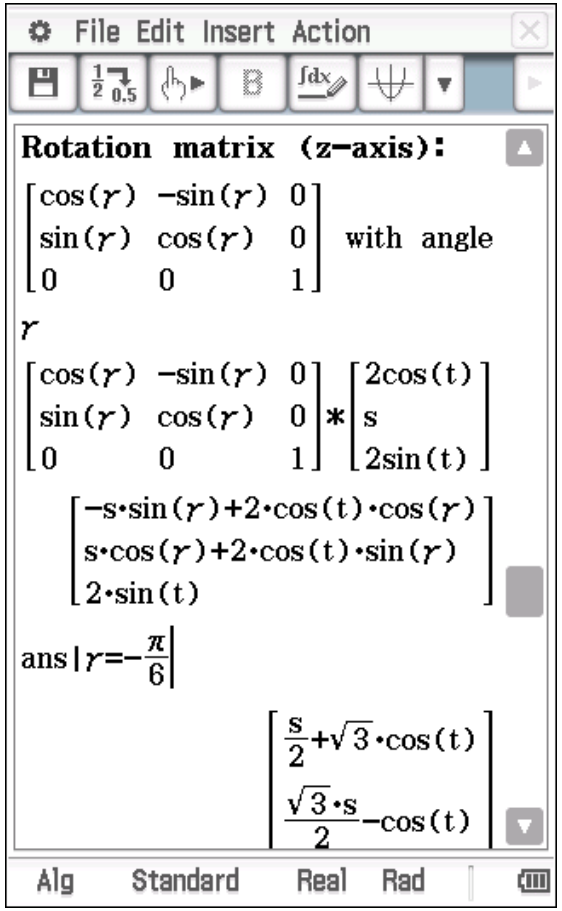
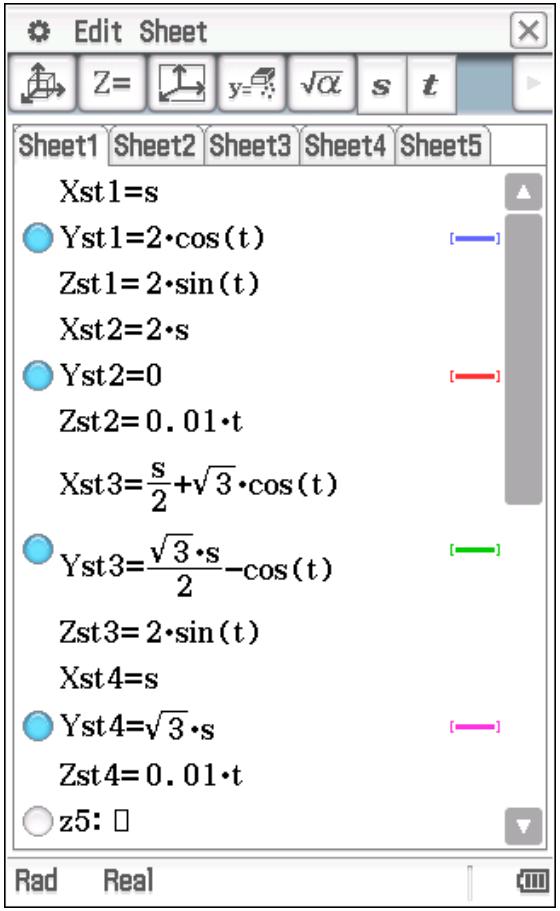
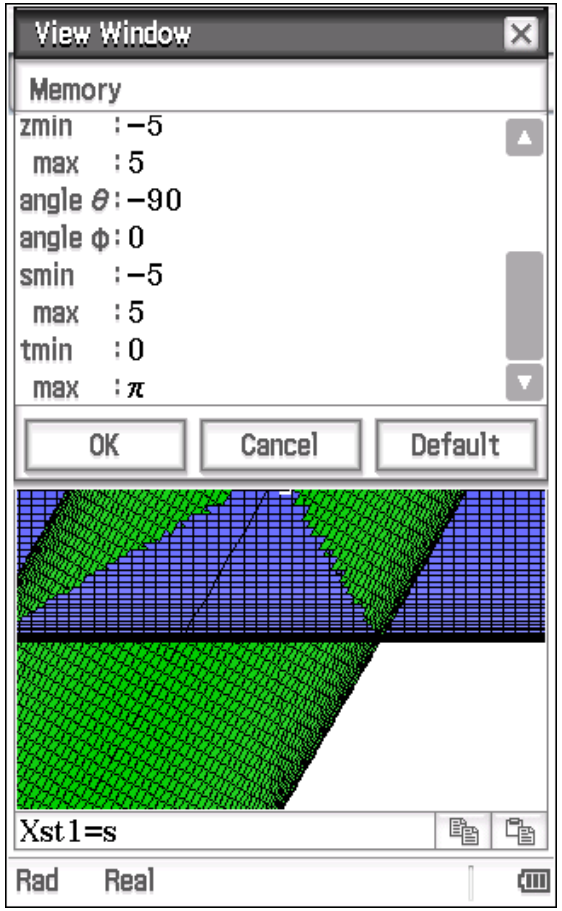
Science Learning with Information Technologies as a Tool for "Scientific Thinking"

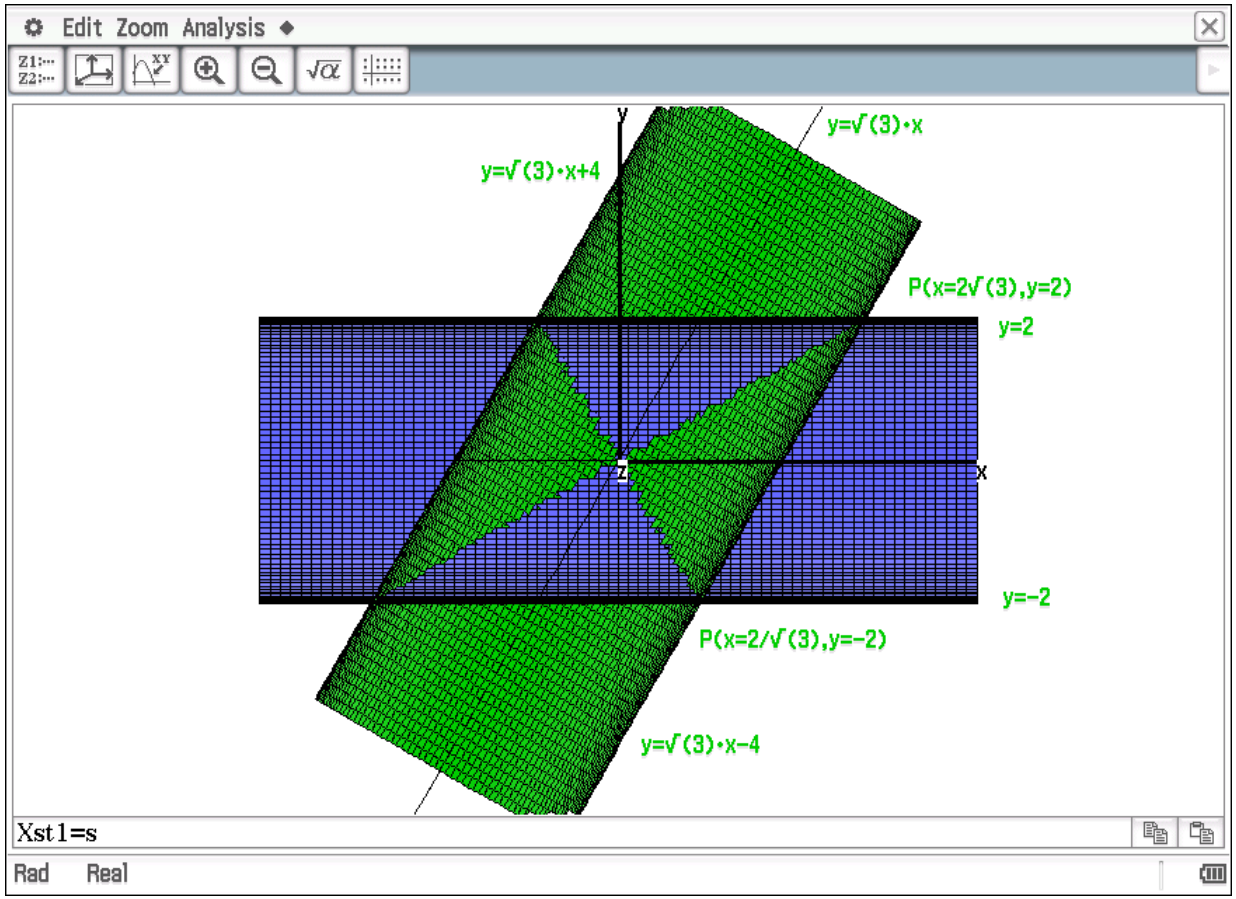


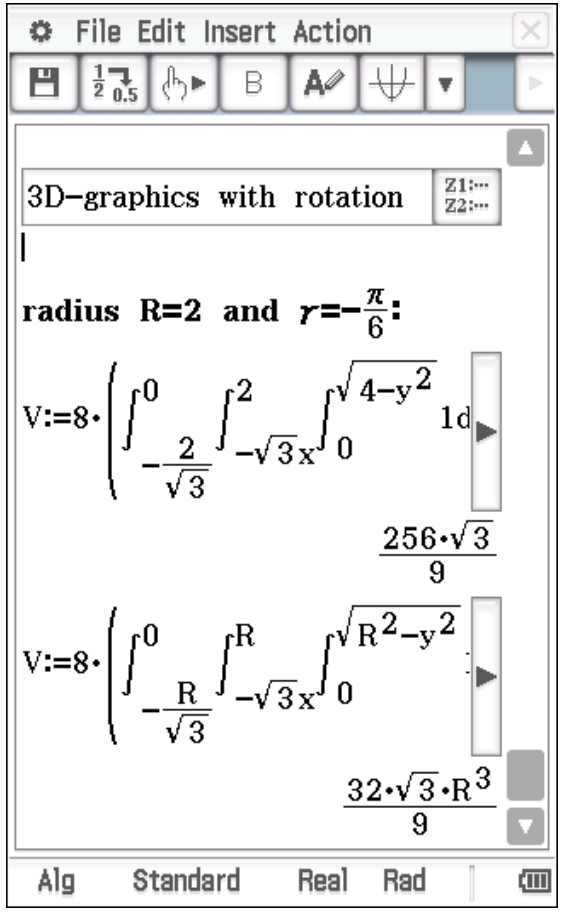




eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

Science Learning with Information Technologies as a Tool for "Scientific Thinking"





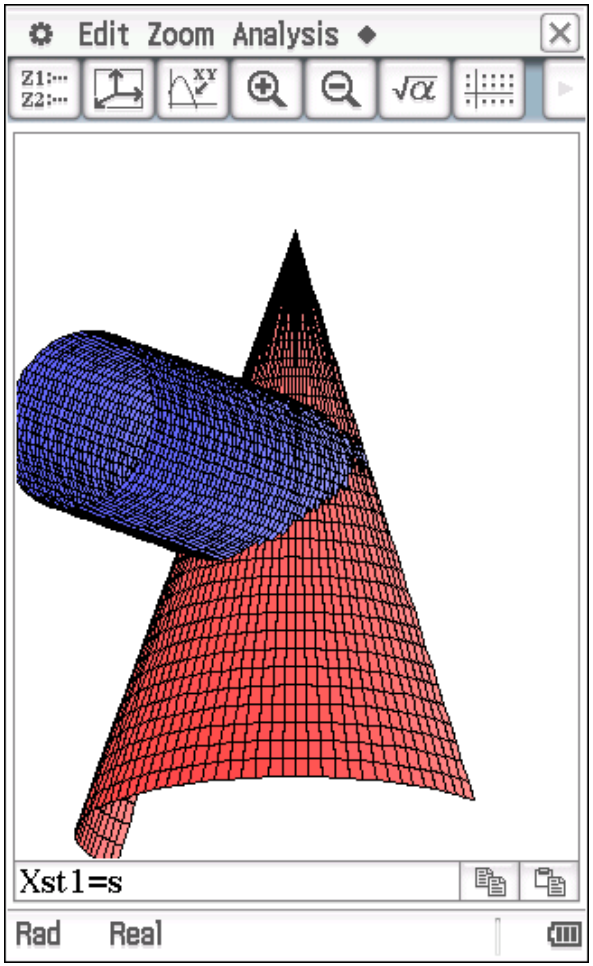
eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

Science Learning with Information Technologies as a Tool for "Scientific Thinking"

Innovative approaches in teaching and learning mathematics

Problem of Visualization

Intersection of a cylinder and a cone



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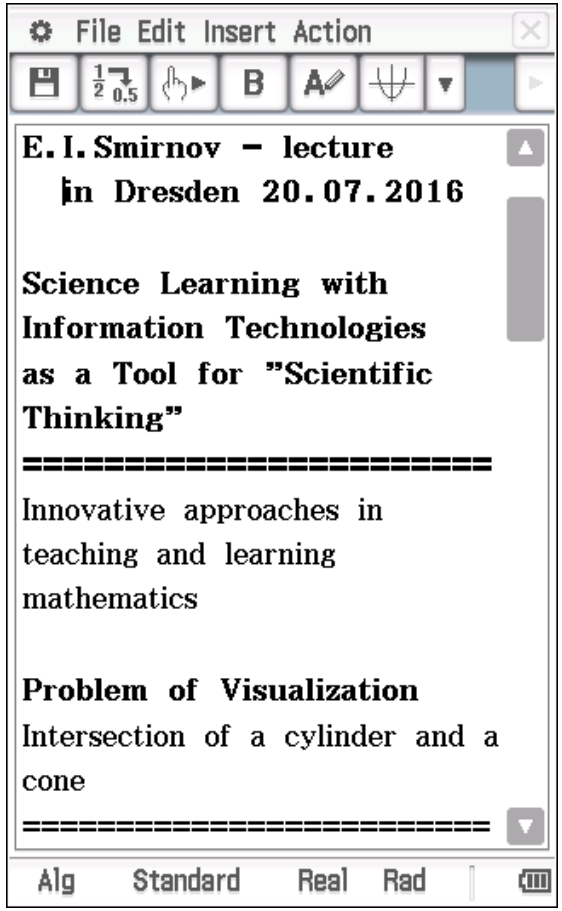
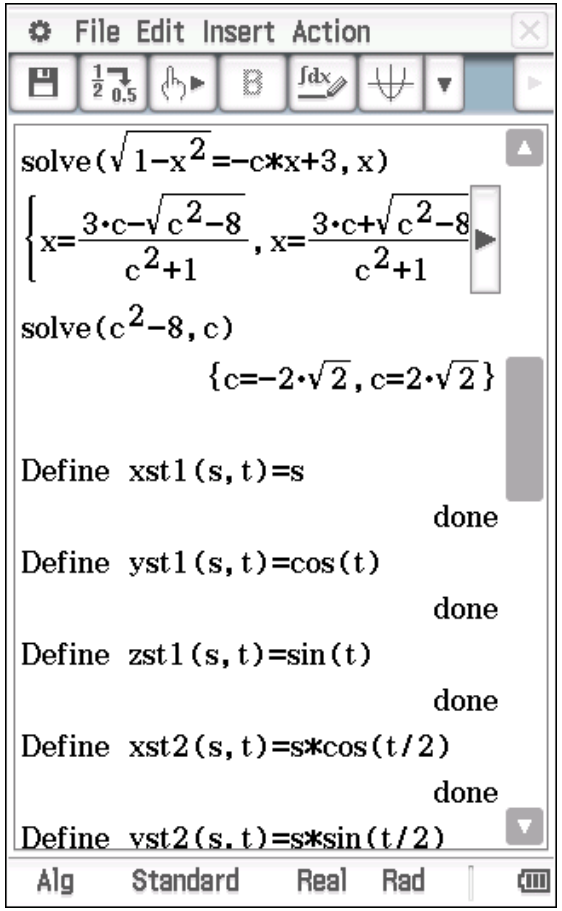
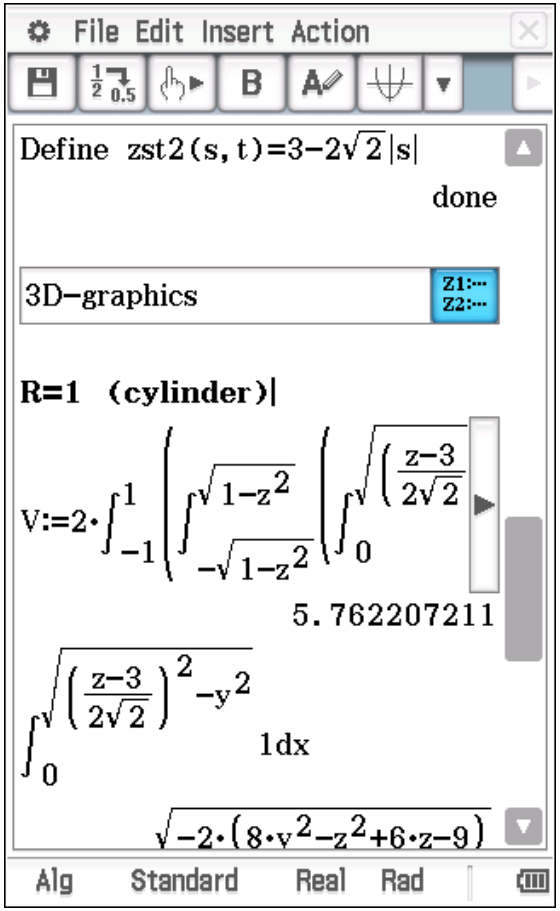
Science Learning with Information Technologies as a Tool for "Scientific Thinking"



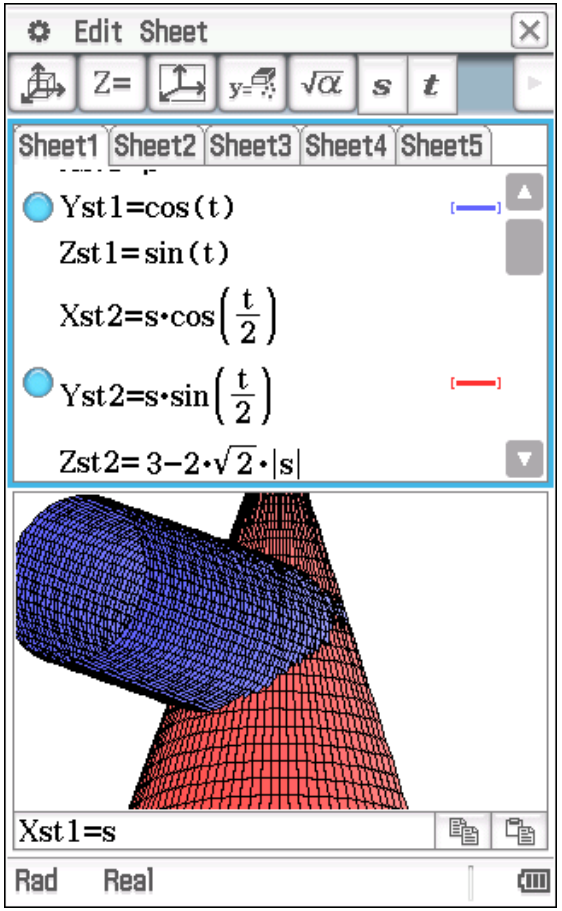


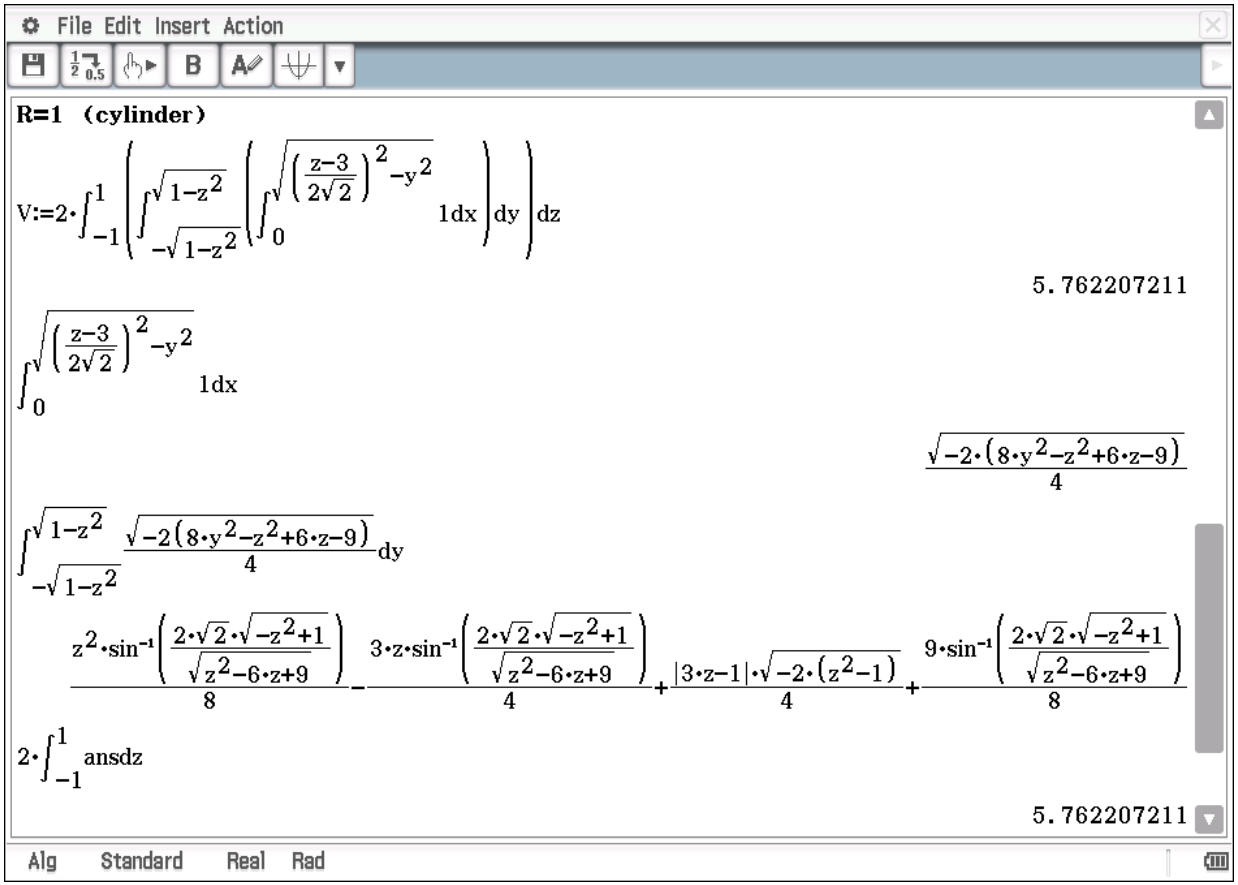


HOCHSCHULE FÜR TECHNIK UND WIRTSCHAFT DRESDEN UNIVERSITY OF APPLIED SCIENCES

eActivity: E.I.Smirnov – lecture in Dresden 20.07.2016

Science Learning with Information Technologies as a Tool for "Scientific Thinking"





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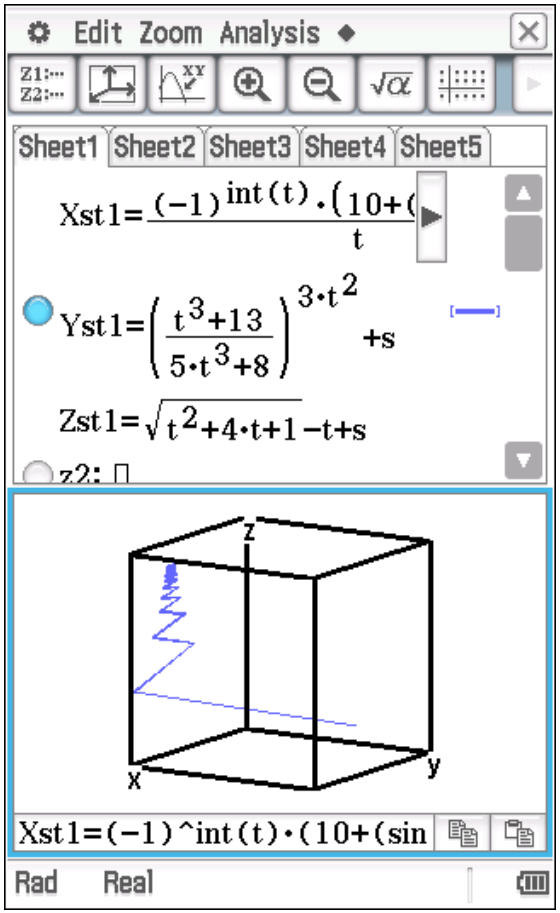
Science Learning with Information Technologies as a Tool for "Scientific Thinking"

Innovative approaches in teaching and learning mathematics

Problem of subject's Essence

To find the limit of a sequence Mn



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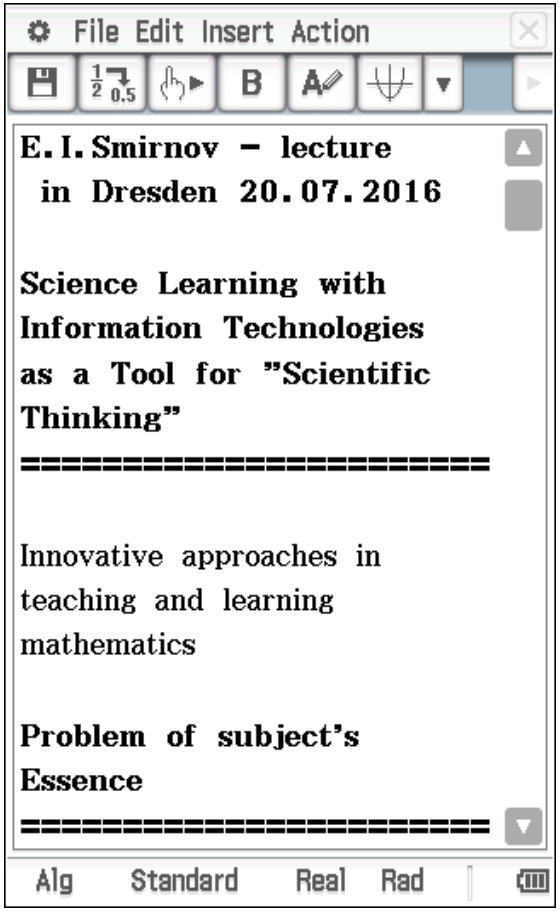
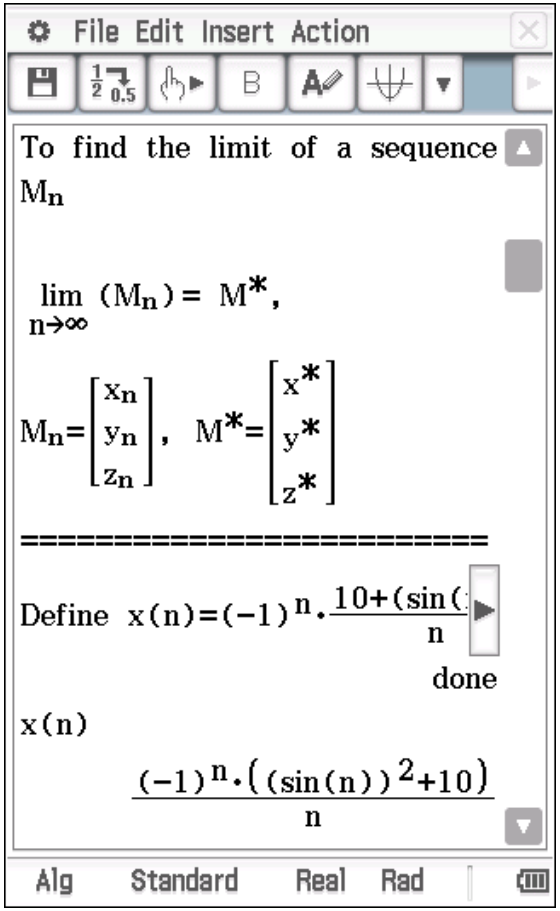
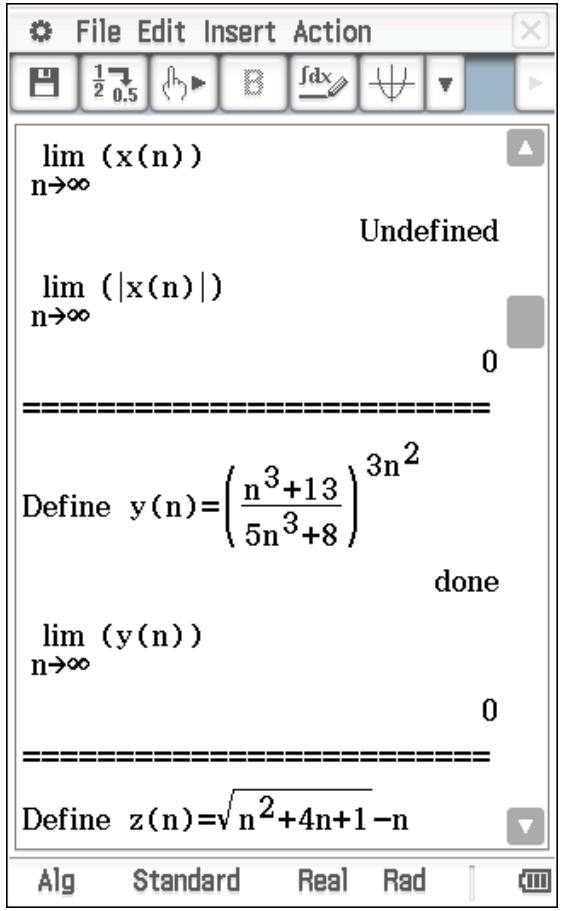
Science Learning with Information Technologies as a Tool for "Scientific Thinking"







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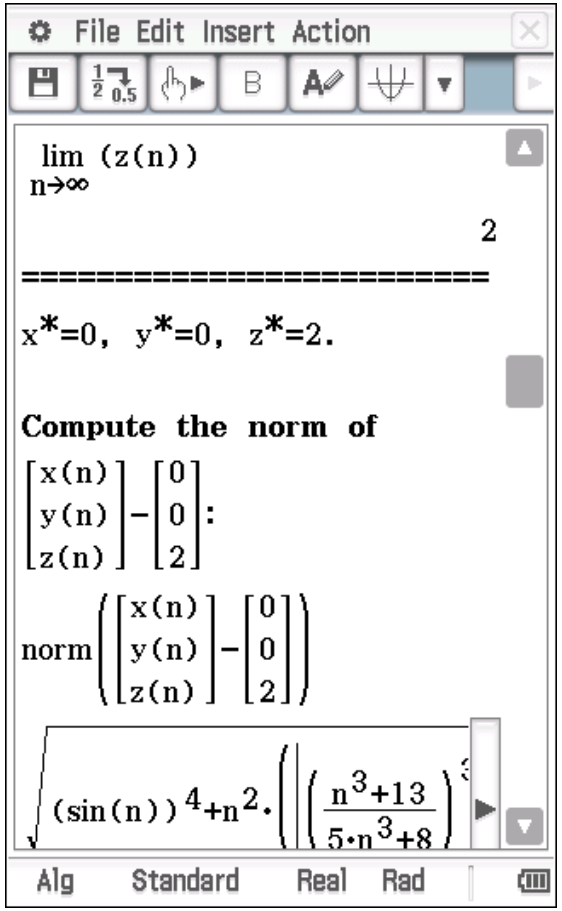

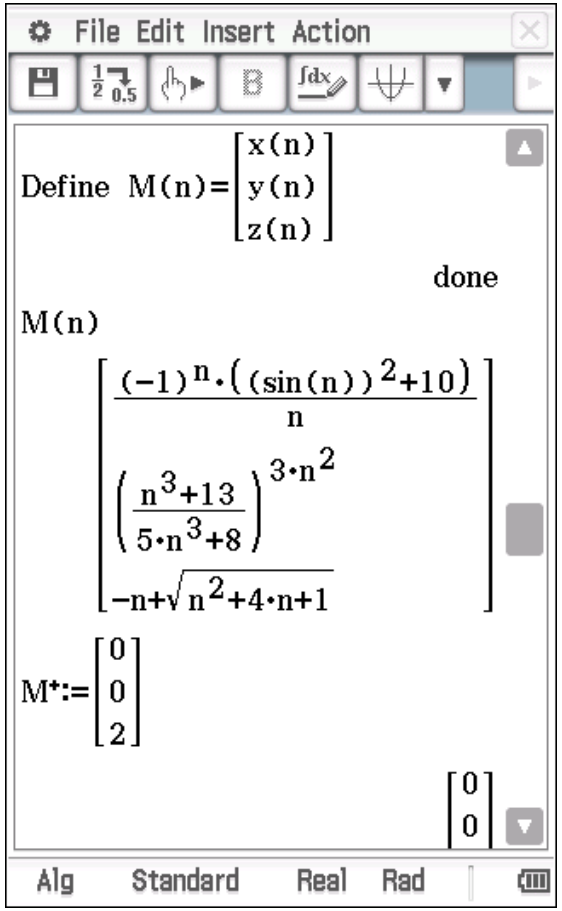

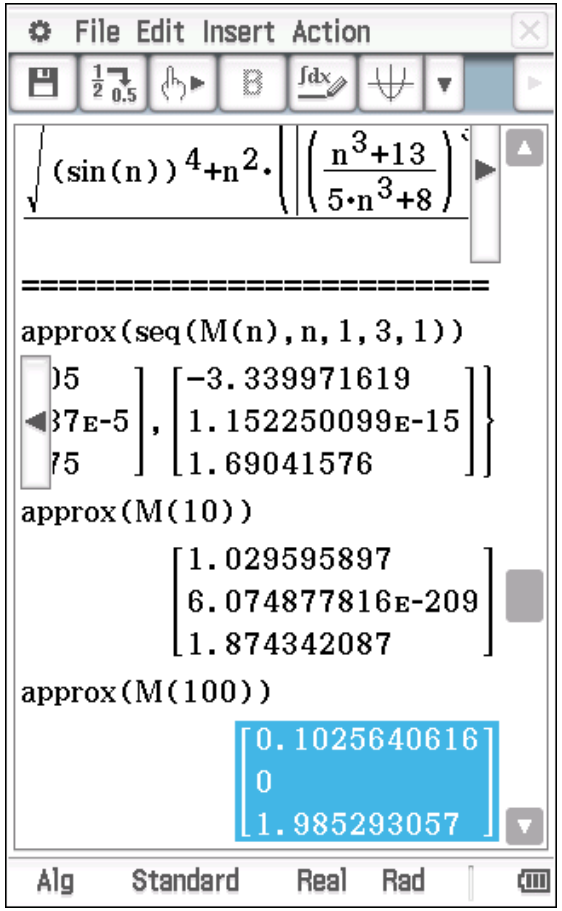

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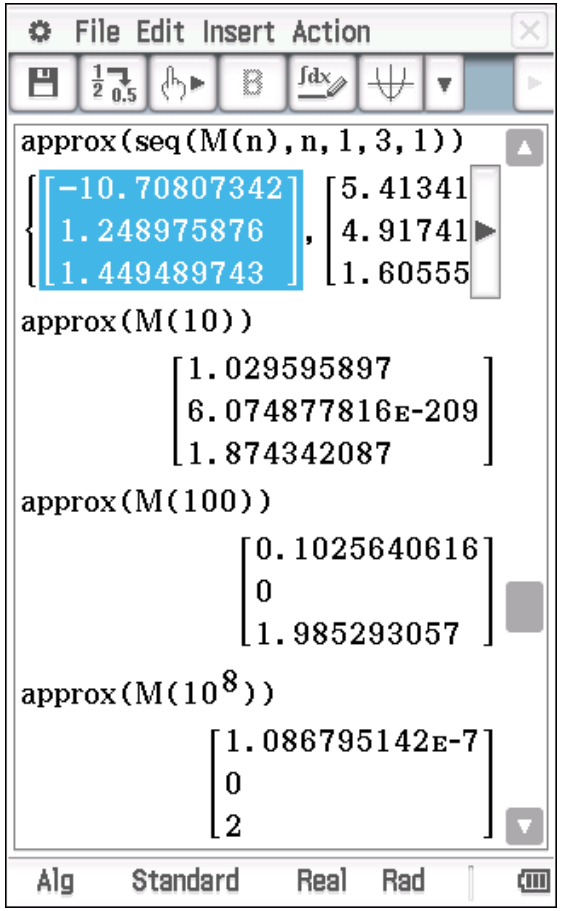

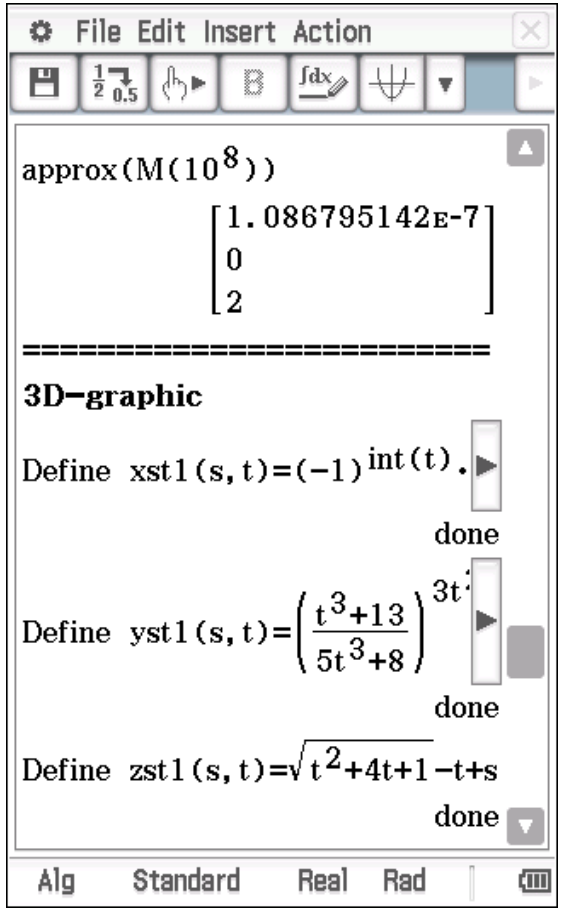

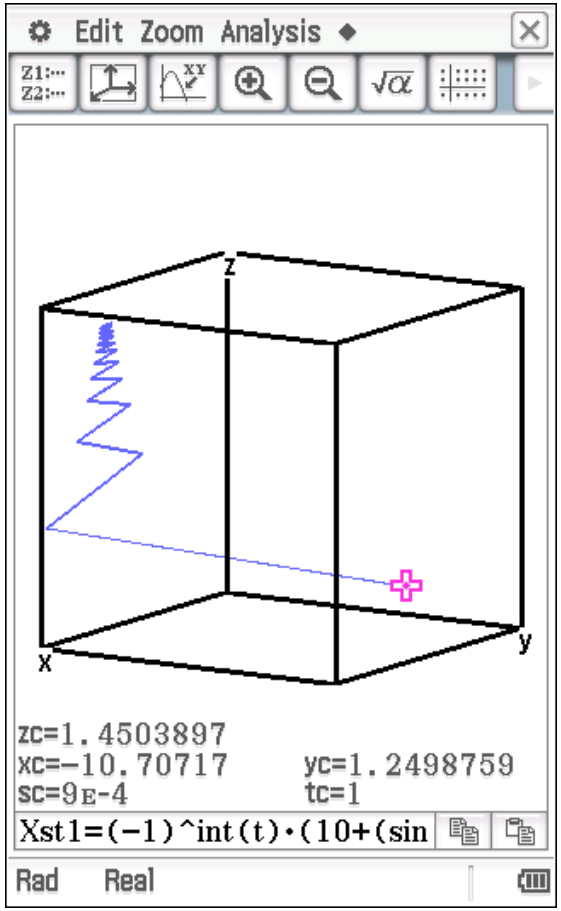

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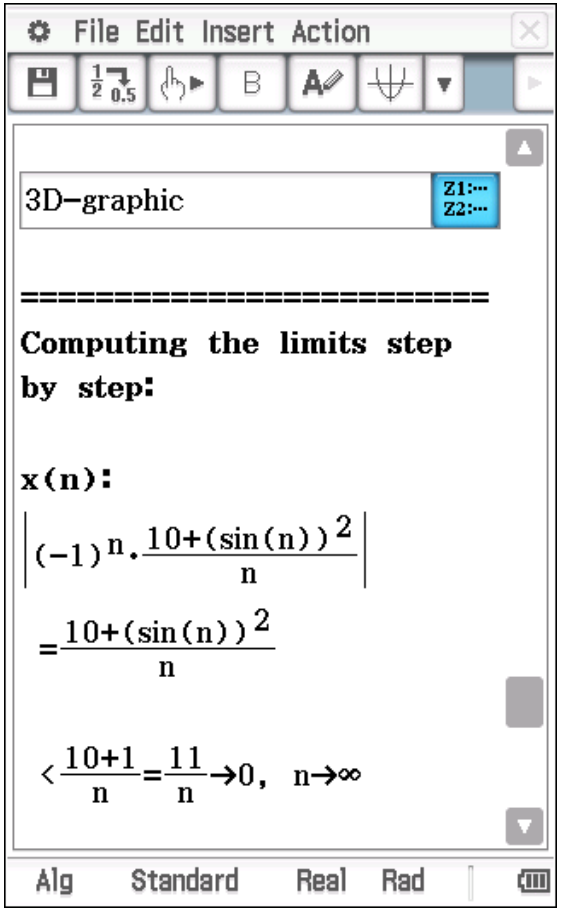

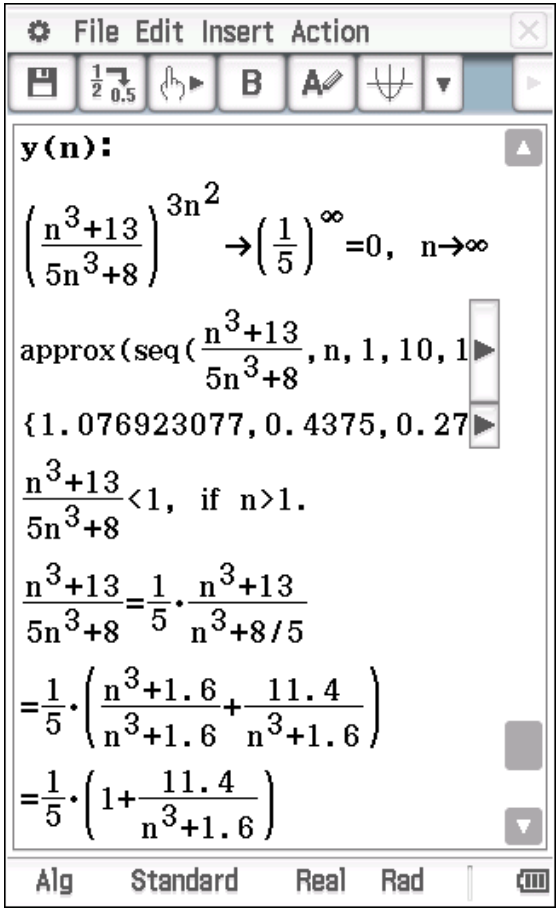

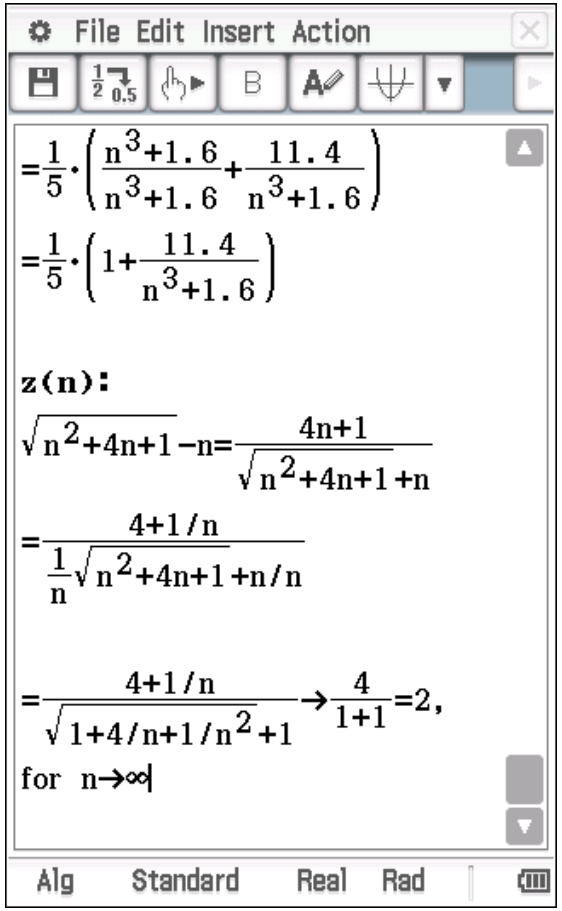


Большое спасибо за ваше внимание!