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SOLUTION OF MICROECONOMICS ASSIGNMENTS BY THE MEANS OF PROGRAM MODULES ISPEZ ON THE DISTANCE PLATFORM MOODLE

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In article basic aspects introduction integrated environment verification knowledge students from microeconomic are expounded. It is considered structure of Decision Environmental with the built-in program modules (mathematical and graphical editors) for the decision of typical assignments from microeconomics during the current and final control of students' knowledges of different forms of teaching.

Keywords: *distance learning systems, microeconomics, testing, tasks, current control knowledge, final control knowledge.*

Simplicity and convenience of program modules are important mean of expanding information technologies. During solution any assignment from microeconomics we need as usually mathematical editor to type formulas and graphical editor to illustrate our results. As rule microeconomics assignment we can solve mathematical and graphical approaches which complete one another.

Many of us may to see and/or to use testing programs, but we can not to propose own origin solution method or approach foe economical and mathematical courses. We only choose proposed answers. More productive to see all steps of solution, because it gives us more information about student' knowledges, than points a, b etc. Even for humanitarian economists (management, marketing sciences) sometimes it is necessary to comment his or her answer because in proposed answers may be duality, inaccuracy, and mistake.

We propose to use next Program Module 'Decision Environmental' for tests, problems and other types of assignments:

Condition	Mathematical Editor
Solution	**Graphical Editor**

Fig. 1. Structure of Decision Environmental

After appearance of assignment with non-trivial solution we can start up Module 'Decision Environmental' (icon looks as calculator), which is integrated in distance platform Moodle – fig. 2.
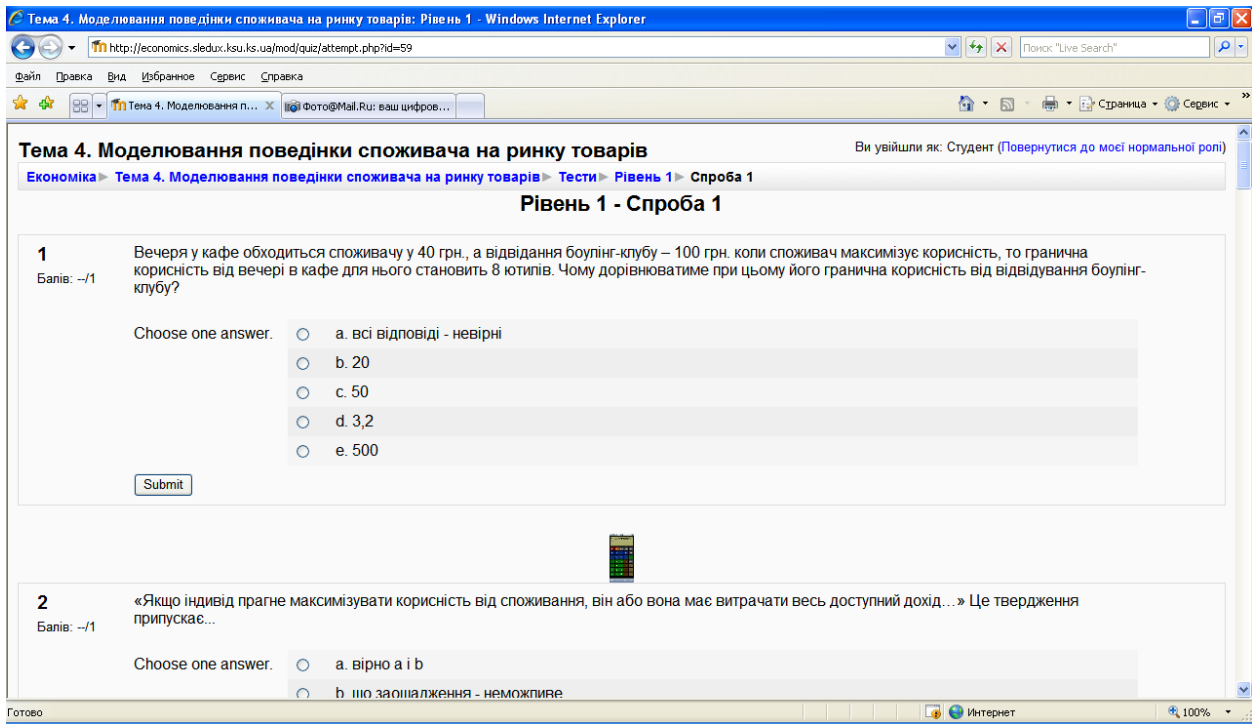
Fig. 2. Start up of Module 'Decision Environmental' from testing

Condition of corresponding assignment will be sent into Decision Environmental (fig. 1). For starting of solution we can use Mathematical Editor which include all basic mathematical operations and symbols and field for typing of formulas (Fig. 3). Technical requirements for program modules are:
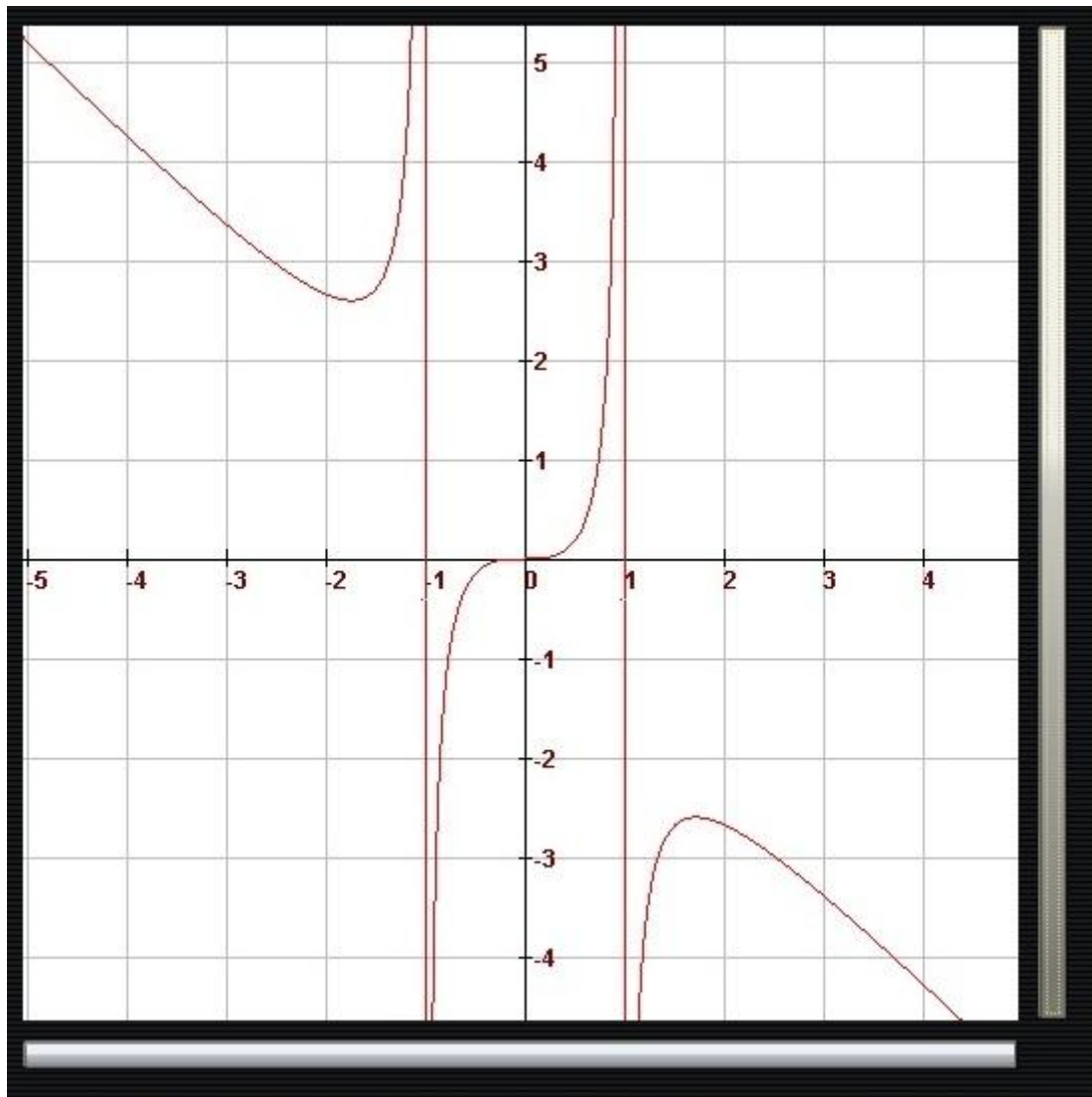
1) internet browser *Mozilla Firefox v. 3.6 and more* (loading first);
2) java-program *jdk-6u12-windows-i586-p* or *jre1.5.0_02* (loading second, built-in internet-browser).

Fig. 3. Mathematical Editor

To each formula if it is necessary we can add comment for explanation of result, conclusion and other purposes. It will be one step. Whole solution are set of these successive steps. Any from these steps we can delete before save of solution. After deleting a step corresponding comment will be deleting too.

For each step we can attach a graph.

Fig. 4. Graphical Editor

This Graphical Editor for convince has vertical and horizontal panels. Horizontal Panel is used for building graphical objects, choosing of their colors, interception point of two graphs etc (Fig. 5). This Panel consists of:

1) Point (Точка);
2) Segment (Відрізок);
3) Polygon (Многокутник);
4) Ellipse (Еліпс);
5) Function (Функція);
6) Min max functions (Функція мінімум і максимум);
7) Select (Обране) – here we can search intersection of two graphs and hatch selected field.
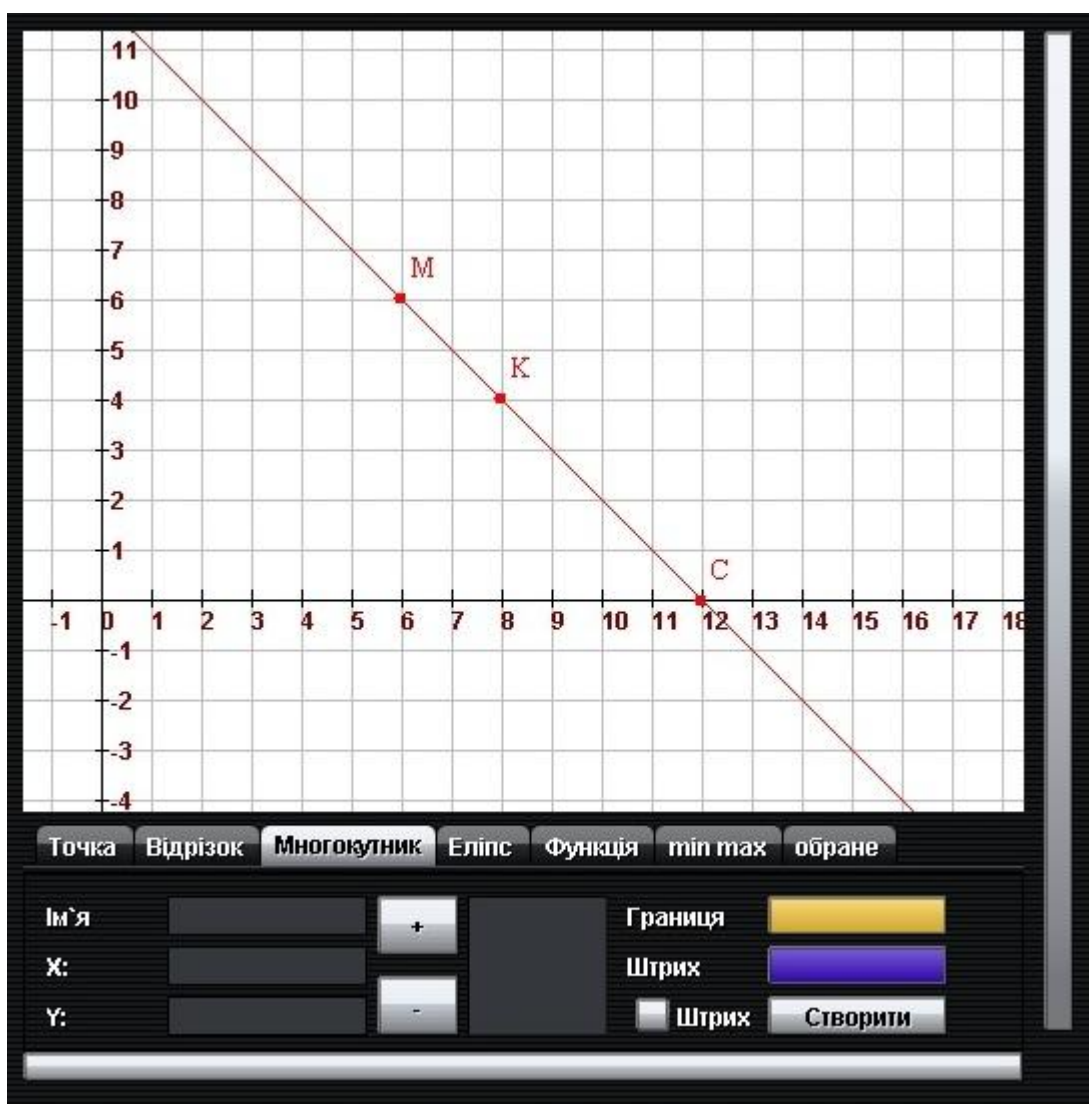
Fig. 5. Horizontal panel of Graphical Editor

After building of all functions we can see ones on vertical panel (fig. 6).
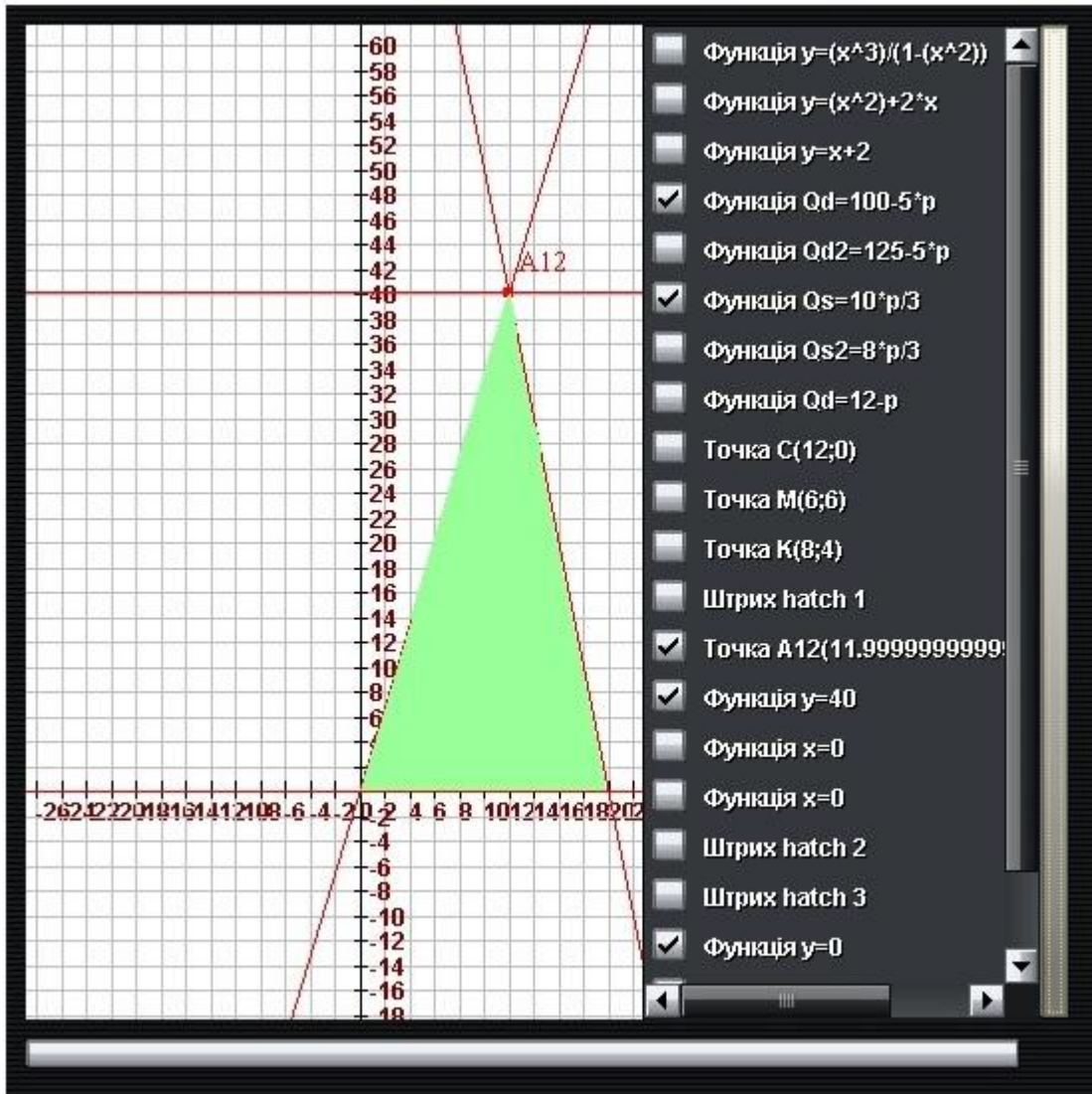
Fig. 6. Vertical panel of Graphical Editor

When solution is completed we finish our results and mark one or more steps as answers (which correspond to questions of assignment).

Tutor can check all result in Report Menu. Here answers for any assignments will be mark out grey color.

As example microeconomics assignment has next structure:

Condition. At the market of mineral artesian water the function of demand is set by equation $Q = 120 - P$, and costs of firms on its receipt are zero ($MC_1 = MC_2 = 0$). We will find an equilibrium at the market at (1) the quasicompetitive pricing; (2) cartel pricing; (3) pricing at quantity competition (Cournout).

Solution

1) $P = MC_i(q_i)$, $P = 120 - Q = 0$, $Q_c^* = 120$, $P_c^* = 120 - Q_c^* = 0$

Comment: Quasicompetitive pricing – consequently firms will get a zero income.

2) $MR(Q) = MC_i(q_i)$, $MR(Q) = 120 - 2 \cdot Q = 0$, $Q_m^* = 60$, $P_m^* = 120 - 60 = 60$, $\pi_m^* = 60 \cdot 60 - 0 = 3600$

Comment: Cartel pricing – an profit of cartel will 3600 UAH

120

3) $\begin{cases} \dfrac{\partial \pi_1}{\partial q_1} = 120 - 2 \cdot q_1 - q_2 = 0, \\ \dfrac{\partial \pi_2}{\partial q_2} = 120 - 2 \cdot q_2 - q_1 = 0; \end{cases}$ $\begin{cases} q_1 = 60 - \dfrac{1}{2} \cdot q_2, \\ q_2 = 60 - \dfrac{1}{2} \cdot q_1. \end{cases}$ $\begin{cases} q_1^* = 40, \\ q_2^* = 40. \end{cases}$

$Q* = 80$, $P_m^* = 120 - 80 = 40$, $\pi_1^* = 40 \cdot 40 = 1600$, $\pi_2^* = 40 \cdot 40 = 1600$

Comment: Pricing at Cournout competition – profits of firms will be equaled on 1600 UAH
The got results are represented on a next graph $P = 120 - Q$ (fig. 5).

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