

Note: There are special instructions in this exam.
Answer the questions according to these instructions

שימו לב: בבחינה זו יש הנחיות מיוחדות.
יש לענות על השאלות על פי הנחיות אלה!

Mathematics

3 Points – 3rd Exam

מתמטיקה

3 יחידות לימוד – שאלון שלישי

Instructions

הוראות

א. Duration of the exam: Two hours

א. משך הבחינה: שעותיים.

ב. Exam structure and breakdown of points:

This exam has six questions on the following topics:
Algebra, Differential and Integral Calculus.

Answer four questions – each question is worth
28 points.

The maximum number of points you can earn
is 100.

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שש שאלות בנושאים:

אלגברה, חשבון דיפרנציאלי ואינטגרלי.

יש לענות על ארבע שאלות – לכל שאלה 28 נקודות.

סך הנקודות לא יעלה על 100.

ג. Material that may be used during the exam:

(1) A non-graphing calculator. You may not use
the programming options of a programmable
calculator.

Use of a graphing calculator or programming
options may lead to the disqualification of
your exam.

(2) Formula sheets (attached)

(3) A Hebrew-foreign language/
foreign language-Hebrew dictionary

ג. חומר עזר מותר בשימוש:

(1) מחשבון לא גרפי. אין להשתמש באפשרויות התכנות

במחשבון שיש בו אפשרות תכנות.

שימוש במחשבון גרפי או באפשרויות התכנות במחשבון

עלול לגרום לפסילת הבחינה.

(2) דפי נוסחאות (מצורפים).

(3) מילון עברי-לועזי/לועזי-עברי.

ד. Special instructions:

(1) Do not copy the question, but do indicate the
number of the question you are answering.

(2) Start each answer on a new page. Write the steps of
the solution in your answer booklet, even when the
calculations are done with a calculator.

Explain all of your work, including calculations, in
detail and in a clear and organized fashion.

Lack of detail may lower your score or lead to the
disqualification of your exam.

ד. הוראות מיוחדות:

(1) אין להעתיק את השאלה; יש לסמן את מספרה בלבד.

(2) יש להתחיל כל שאלה בעמוד חדש. יש לרשום במחברת

את שלבי הפתרון, גם כאשר החישובים מתבצעים בעזרת
מחשבון.

יש להסביר את כל הפעולות, כולל חישובים, בפירוט ובצורה
ברורה ומסודרת.

חוסר פירוט עלול לגרום לפגיעה בציון או לפסילת הבחינה.

Write in the answer booklet only. Write "טיוטה" at the top
of every page you use for draft.

If you write draft material outside the answer booklet,
your exam may be disqualified.

יש לכתוב במחברת הבחינה בלבד. יש לרשום "טיוטה" בראש
כל עמוד המשמש טיוטה.

כתובת טיוטה בדפים שאינם במחברת הבחינה עלולה לגרום
לפסילת הבחינה.

Good Luck!

בהצלחה!

Questions

Answer four of the questions 1-6 (each question is worth 28 points).

If you answer more than four questions, only the first four answers in your answer booklet will be graded.

Note: Explain all of your work, including calculations, clearly and in detail.

Lack of detail may lower your score or lead to the disqualification of your exam.

Algebra

1. Rona bought one ring and two bracelets in a jewelry store. The price of the two bracelets was identical.

In this jewelry store, the price of the ring and two bracelets came to a total of 1,784 shekels.

For each bracelet Rona was given a 15% discount off the original price, and she paid the original price for the ring. The price of the ring and two bracelets after the discount came to a total of 1,595 shekels.

- א. What was the price of one ring, and what was the price of one bracelet before the discount (the original price)?

Shlomit bought the same jewelry – a ring and two bracelets – on the store's website.

She received a 10% discount off the original price for the ring,

and for the two bracelets that she bought she received a 25% discount off the original price for the second bracelet only.

- ב. How much did Shlomit pay in total for the ring and two bracelets on the website?

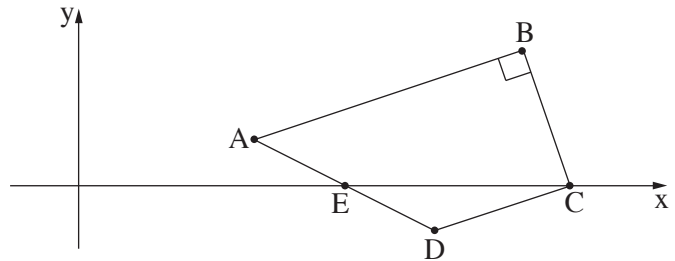
2. In Quadrilateral ABCD, Side AB is perpendicular to Side BC (see figure).

Given: A (4, 1), B (10, 3)

- א. (1) Find the slope of Side AB.
 (2) Find the equation of Side BC.

Vertex C is located on the x-axis.

- ב. Find the coordinates of Vertex C.



Given: Point E (6, 0) is the midpoint of Side AD.

- ג. Find the coordinates of Vertex D.
 ד. Show that Side DC is perpendicular to Side BC.
 ה. Show that Triangle BCD is an isosceles triangle [משולש שווה שוקיים].

3. The figure to the right shows a circle whose center is at Point M (5, 6).

Point A (3, 9) is located on the circle.

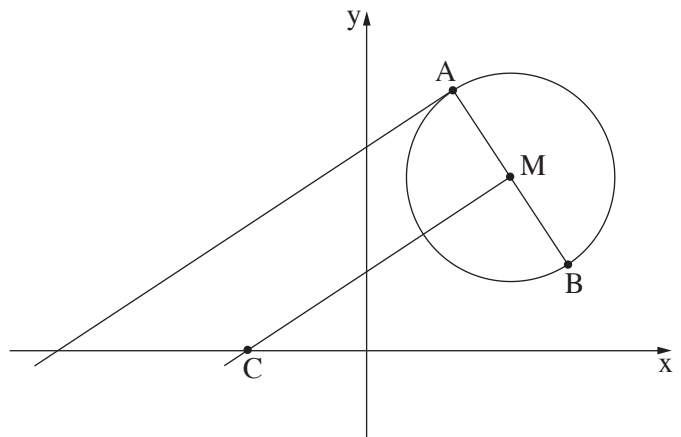
- א. (1) Find the radius of the circle.
 (2) Write the equation of the circle.

AB is a diameter of the circle.

- ב. Find the coordinates of Point B.

A tangent to the circle is drawn through Point A (see figure).

- ג. Find the slope of this tangent.



A line parallel to this tangent is drawn through Point M.

This line intersects the x-axis at Point C.

- ד. (1) Find the equation of Line MC.
 (2) Find the area of Triangle BCM.

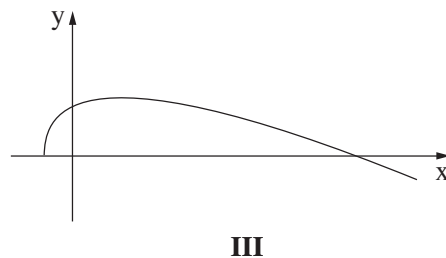
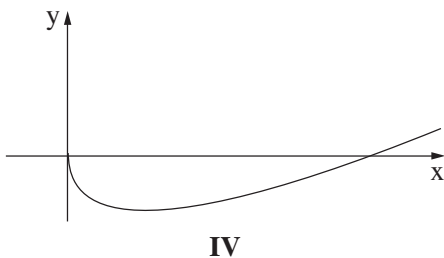
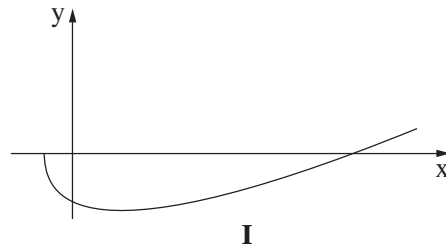
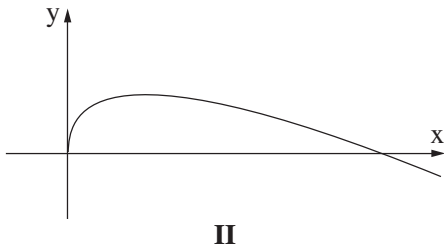
Differential and Integral Calculus

4. Given: function $f(x) = 0.5x - 6\sqrt{x}$.

- א. Find the domain [תחום ההגדרה] of function $f(x)$.
- ב. Find the coordinates of the intersection point of the graph of function $f(x)$ with the y-axis.
- ג. Find the coordinates of the interior extremum [נקודת הקיצון הפנימית] of function $f(x)$, and determine what type of extremum it is.
- ד. One of the graphs I - IV below describes the graph of function $f(x)$. Determine which graph it is.
- ה. Consider the two statements below.

Determine whether each statement is correct or incorrect. Explain your answers.

- (1) There are two points on the graph of function $f(x)$ whose y-coordinate is -12 .
- (2) There are two points on the graph of function $f(x)$ whose y-coordinate is 12 .



5. Given: the function $f(x) = 2x^2 - 12x + 18$,

and the line whose equation is $y = x + 3$.

Function $f(x)$ intersects the x -axis at Point A.

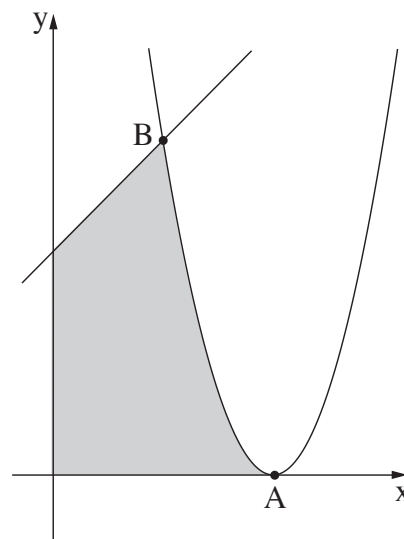
Point B is one of the intersection points of function $f(x)$ and the line, as shown in the figure on the right.

א. (1) Find the coordinates of Point A.

(2) Find the coordinates of Point B.

ב. Calculate the area of the shaded region in the figure:

the area bounded by the graph of function $f(x)$, the line, and the axes.



6. The figure on the right shows the graphs of the function $f(x) = -x^2 - x + 10$

and the line $y = 2$.

Point A is located on the graph of function $f(x)$ in the first quadrant,

and Point B is located on the line, below Point A, such that Segment AB is parallel to the y -axis.

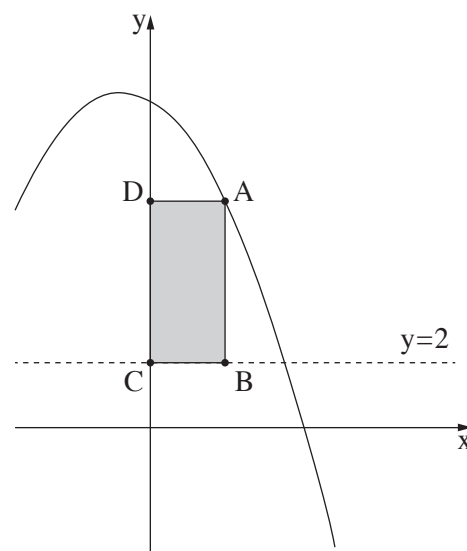
Points C and D are located on the y -axis, such that Quadrilateral ABCD is a rectangle, as shown in the figure.

Let x denote the x -coordinate of Point A.

א. (1) Express the y -coordinate of Point A in terms of x .

(2) Express the length of Segment AB in terms of x .

ב. Find the x -coordinate of Point A for which the area of Rectangle ABCD is greatest (maximum).



Good Luck!

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בהצלחה!

זכות היוצרים שמורה למדינת ישראל
אין להעתיק או לפרסם אלא ברשות משרד החינוך