

Note: This exam has special instructions.
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

א. Duration of the exam: Two and a quarter hours

הוראות

א. משך הבחינה: שעתיים ורבע.

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
27 points.

The maximum total 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 27 נקודות.

סך הכל – 100 נקודות לכל היותר.

ג. Material that may be used during the exam:

ג. חומר עזר מותר בשימוש:

(1) A non-graphing calculator. Do 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.

(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:

ד. הוראות מיוחדות:

(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 your work, including calculations,
in detail and in a clear and organized fashion.

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

(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 "טייטה" at the top
of every page you use for draft work.

If you use pages outside the answer booklet for draft work,
your exam may be disqualified.

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

כתיבת טייטה בדפים שאינם במחברת הבחינה עלולה לגרום לפסילת
הבחינה.

Good Luck!

בהצלחה!

Questions

Answer four of the questions 1–6 (each question – 27 points).

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

Algebra

1. A local pizza shop makes two sizes of pizza: personal pizzas and family pizzas.

120 grams of flour are used to make a personal pizza, and 250 grams of flour are used to make a family pizza.

One day, the number of personal pizzas the pizza shop made was 3 times greater than the number of family pizzas made that day.

All the pizzas made that day required a total of 17,690 grams of flour.

- א. Find how many family pizzas were made in the pizza shop that day.

The price of a family pizza is 26 shekels more than the price of a personal pizza.

All the pizzas made that day were sold for a total of 4,524 shekels.

- ב. Find the price of a personal pizza and the price of a family pizza.
 ג. Find by what percentage the price of a family pizza is higher than the price of a personal pizza.

2. Consider a right triangle ABC ($\angle ABC = 90^\circ$).

The vertices A and C are located on the y -axis, as shown in the figure.

The equation of Side AB is $y = -\frac{4}{5}x + 24$.

- א. Find the coordinates of Vertex A .

We know that $C(0, -17)$.

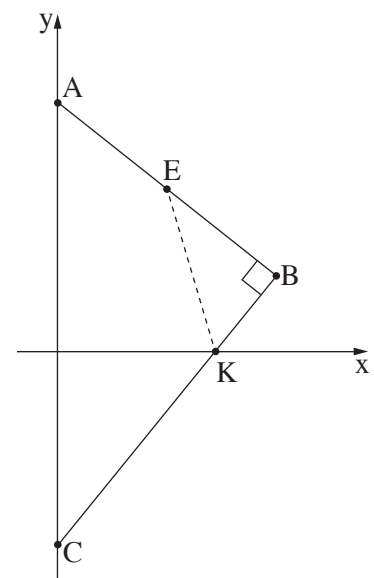
- ב. (1) Find the equation of Side BC .
 (2) Find the coordinates of Vertex B .

Point E is the midpoint of Side AB .

- ג. Find the coordinates of Point E .

Point K is the intersection point of Side BC with the x -axis.

- ד. (1) Find the coordinates of Point K .
 (2) Find the area of Triangle EBK .



3. Consider a circle of center M whose equation is $(x - 1)^2 + (y - 4)^2 = 25$.

The circle intersects the x -axis at Points A and B , as shown in the figure.

א. What are the coordinates of the center of the circle, M ?

ב. Find the coordinates of Points A and B .

A tangent to the circle was drawn through Point A .

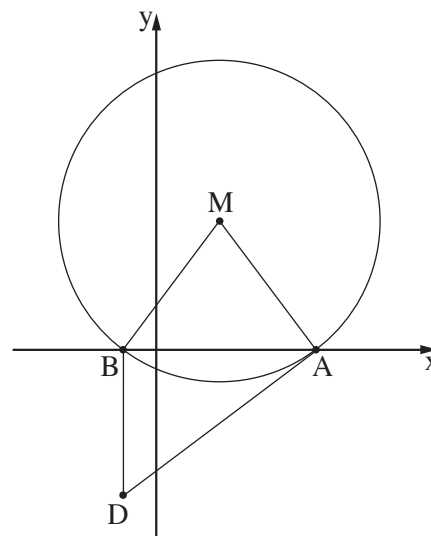
ג. (1) Find the slope of AM .

(2) Find the equation of the tangent.

Point D is located on the tangent such that BD is parallel to the y -axis.

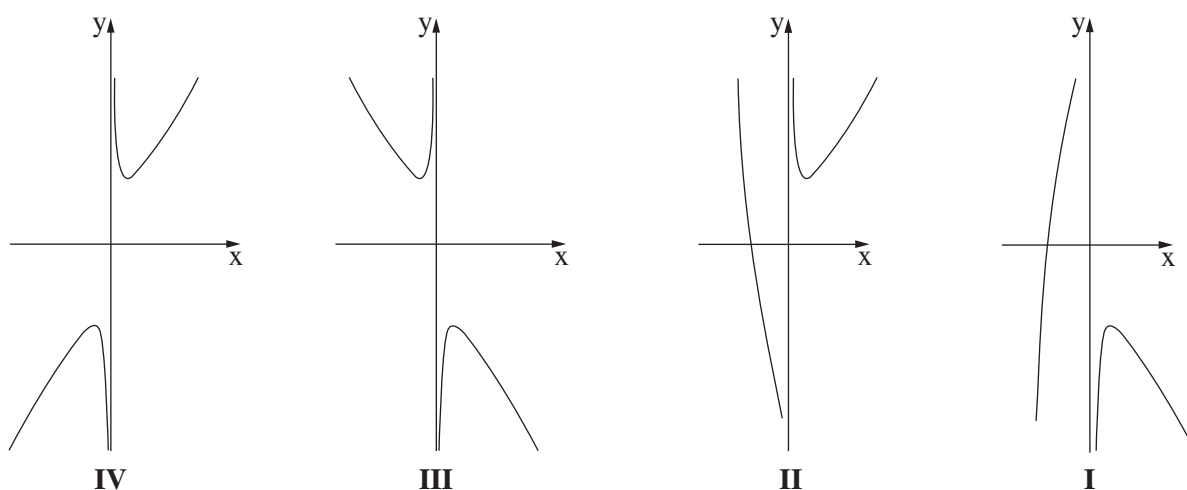
ד. Find the coordinates of Point D .

ה. Find the perimeter of Quadrilateral $AMBD$.



4. Consider function $f(x) = 2.5x + \frac{40}{x} - 3$.

- א. Find the domain [תחום ההגדרה] of function $f(x)$.
- ב. Find the coordinates of the extrema [נקודות קיצון] of function $f(x)$ and determine what type of extrema they are.
- ג. Find the intervals on which function $f(x)$ is decreasing.
- ד. Determine which of the graphs I–IV below describes function $f(x)$.
- ה. Write an example of an equation of a line that is parallel to the x-axis and intersects the graph of function $f(x)$ at two points.



5. The figure on the right describes the graph of function $f(x) = 2x^3 - 4x + 5$.

Point A is located on the graph of function $f(x)$ and its x-coordinate is 1.

A tangent to the graph of function $f(x)$ was drawn through Point A.

א. (1) Find the slope of the tangent.

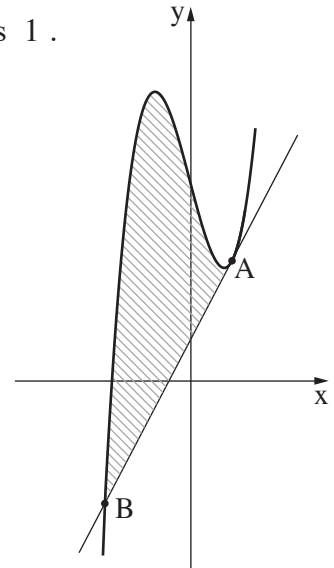
(2) Find the equation of the tangent.

The tangent intersects the graph of function $f(x)$ at another point

$B(-2, -3)$.

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

the region bounded by the graph of function $f(x)$ and the tangent.



6. The figure on the right describes the graph of function $f(x) = -4x^2 + 21x - 17$.

א. Find the coordinates of the intersection points of the graph of function $f(x)$ with the x-axis.

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

Point B is located on the x-axis and Point C is located on the y-axis, such that Quadrilateral ABOC is a rectangle (Point O is the origin).

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 perimeter of the rectangle in terms of x .

ב. Find the value of x for which the perimeter of the rectangle is maximum.

