

Prof. Ebru Bekyel

March 15, 2025

Your Name

Student ID

Teaching Assistant

Quiz Section

--	--

**READ THE INSTRUCTIONS!**

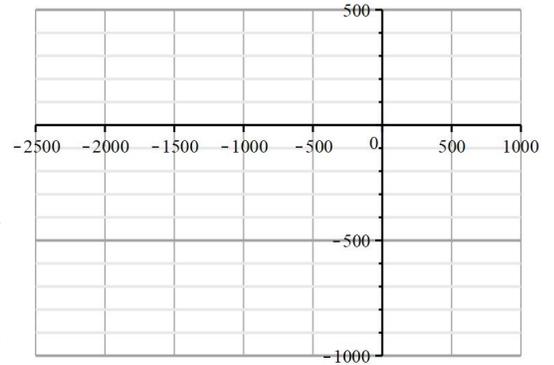
- These exams will be scanned. Write your name, student number and quiz section clearly. If you make a mistake and want to change your response, erase well. Scratch paper is not allowed.
- Turn off and stow away all cell phones, smart watches, and other similar devices. No earbuds, headphones, or any kind of connected devices allowed during the exam.
- This exam is closed book. You may use one 8.5" × 11" sheet of handwritten notes (both sides OK). Do not share notes. No photocopied or printed materials are allowed.
- Give your answers in exact form unless instructed otherwise. For example,  $\frac{\pi}{3}$  or  $5\sqrt{3}$  are exact numbers while 1.047 and 8.66 are decimal approximations for the same numbers.
- You can only use a Texas Instruments TI-30X IIS calculator.
- In order to receive credit, you must show all of your work on the question page. Otherwise you may get little or no credit for it, even if your answer is correct.
- This exam has 7 pages plus this cover page with 6 questions. Please make sure that your exam is complete.

*I have read and followed all of the instructions.  
I have not received any unauthorized help during  
the exam and all the work on this exam is mine.*

Student Signature

1. (19 points) On a simplified map of Europe, Vienna is 400 miles North of Zagreb, Belgrade 300 miles east of Zagreb. Madrid is 800 miles South and 2100 miles West of Zagreb, and Constantinople is 3000 miles East of Madrid.

- (a) Mark the cities with their initials on the coordinate axes putting Zagreb at the origin.
- (b) Suleiman leaves Constantinople with his army on May 10, 1529 headed towards Vienna at a constant speed. Two weeks into the trip, Charles's spy predicts that Suleiman will reach Belgrade 80 days after leaving Constantinople. Give linear equations for Suleiman's coordinates  $x$  and  $y$  as functions of  $t$  in days.



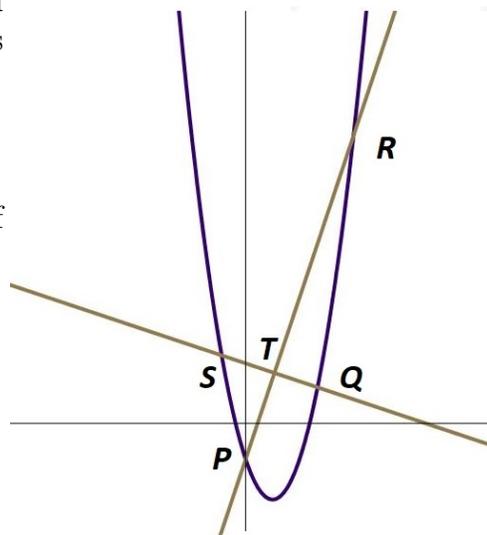
- (c) The spy sends out a pigeon with his prediction which takes 10 days to fly to Madrid. Charles, expecting the news, leaves immediately for Vienna. How fast should his army travel, in miles per day, so the two armies meet in Vienna? *Round your answer to two digits after the decimal.*

2. (16 points) The Giant Ferris Wheel in Vienna has a diameter of 61 meters and turns at a linear speed of 2.7 kilometers per hour. You get on it at its lowest points which is four meters above ground. During the first 10 minutes of your ride, at what times will your height above ground be exactly 45 meters?

3. (19 points) The graph on the right shows a parabola and two *perpendicular* lines. The coordinates of the three points of intersection are given as

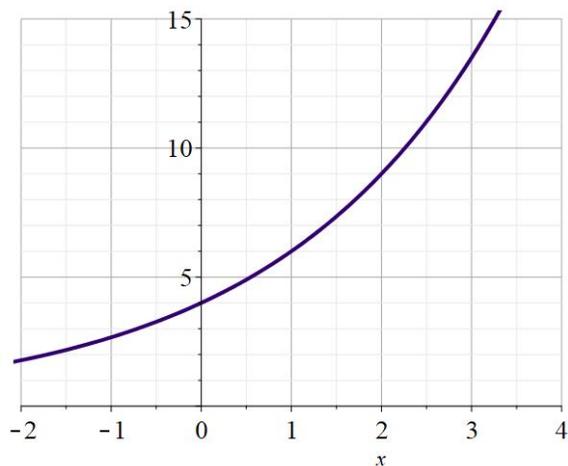
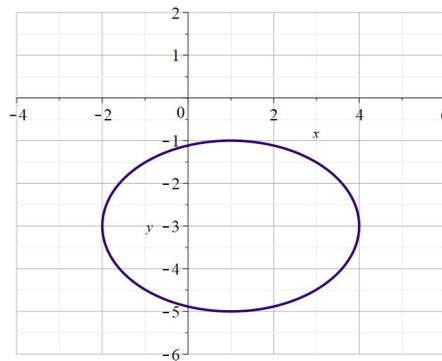
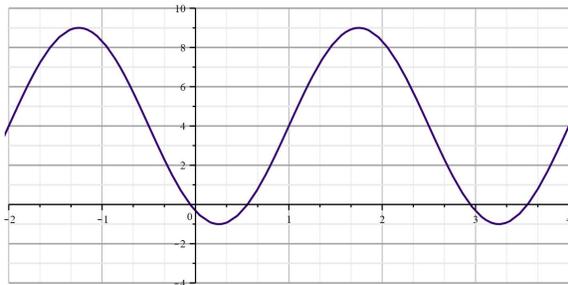
$$P(0, -1), Q(2, 1), R(3, 8).$$

What are the coordinates of the other two points of intersection  $T$  and  $S$ ?

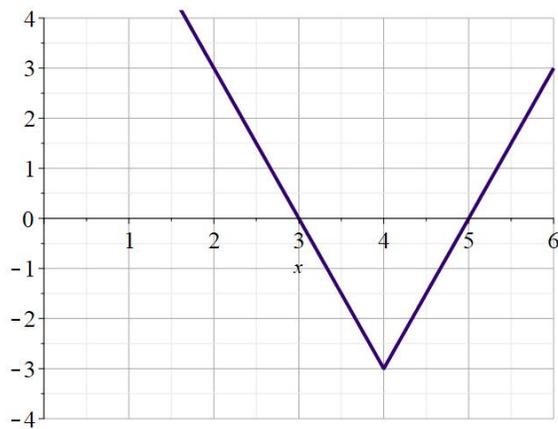


The coordinates of the points are  $T$   and  $S$  .

4. (16 points) Write down the equations of the following graphs.



This one is an exponential function.



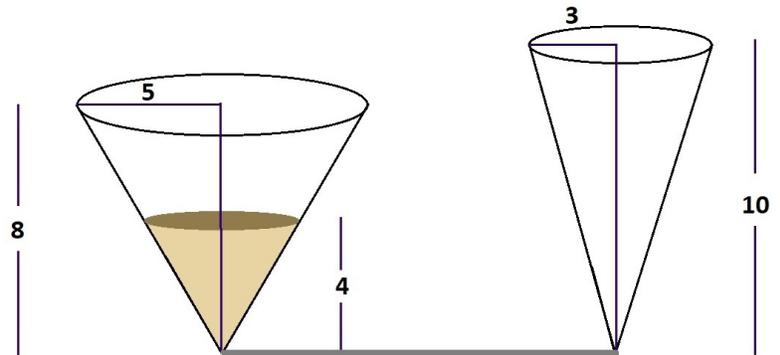
Write one equation with absolute value.

*Try multi-part version first.*

5. (15 points) Two conical tanks are connected by a pump. The first tank has a radius of 5 meters and a height of 8 meters. The second tank has a radius of 3 meters and a height of 10 meters. Initially, the first tank is partially filled with oil, which has a depth of 4 meters as shown.

The volume of a cone with radius  $r$  and height  $h$  is  $V = \frac{1}{3}\pi r^2 h$ .

- (a) What percentage of the first tank by volume is full?



- (b) The oil is pumped (pump not shown) from the first tank to the second so the first tank and the pipe are empty and the oil is completely in the second tank. What will be the depth of the oil in the second tank?

6. (15 points) Solve for  $x$ .

(a)  $7 - \ln(2 + 3x) = 4$

(b)  $6e^{2x} + 13e^x = 5$

(c)  $2 - x + |3x - 5| = 1$

*This page is blank. If you continued a question here, make a note on the question page so we check it.*