Math 125 – Fall 2017
Exam 1B

Name: _____

Chapter 1, Sections 1-5
Chapter 2, Sections 1 ,2, 3, 5, 6
Chapter 3, Sections 1-2

Instructions: You must solve each question completely, explaining your reasoning. Partial credit will be awarded for answers that are incorrect, but show progress towards a correct solution. You will not receive credit if you do not clearly show how you are obtaining your answers. Grading will be based on the solution and your write-up. Do all the work on the exam.

1. *(24 Points)* A plumber charges $22 for a house call plus $35 per hour while she is there, up to a maximum of 12 hours.

   a. Express her cost C as a function of the number of t hours.

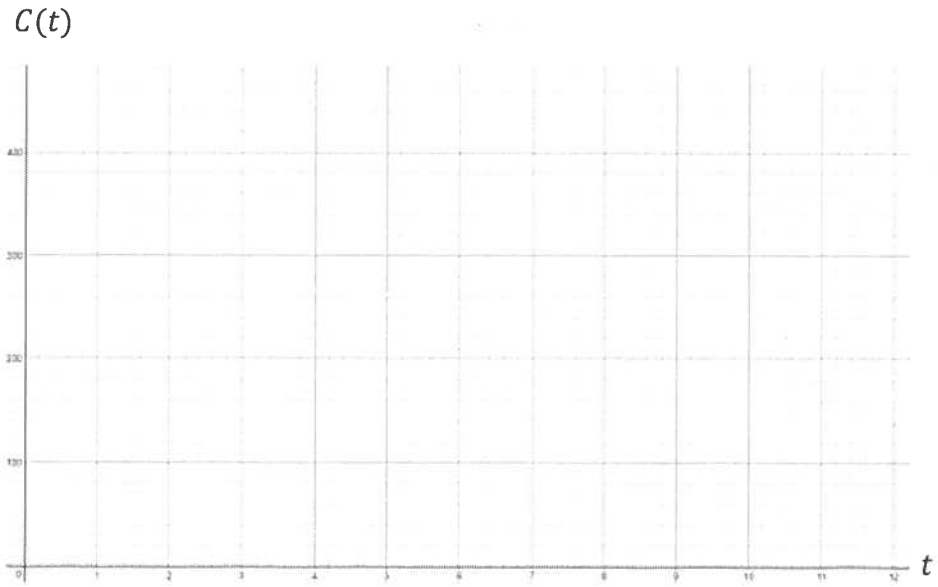
   b. What is the domain and range?

   c. Evaluate C(6) describe what they represent in this context.

   d. Interpret $C^{-1}(389.5) = 10.5$ in this context.

   e. Solve C(t) = 372 and describe what it represents in this context.

   f. Graph the function on the axis provided.



2. *(20 Points)* The monthly rent of a storage shed is a linear function. The size of the shed varies from $150ft^2$ *to* 10,000 ft^2. A $300ft^2$ rents for \$490.00 where as a $150ft^2$ rents for \$320.00.
   a. What was the average rate of change in **dollars per ft^2**?

   b. Construct a linear function C(t) for the monthly rent in dollars where **t is additional square feet after $150ft^2$.**

   c. What is the slope of the line? Explain what the value of the slope means in the context of this problem.

   d. What is the vertical intercept of the line? Explain what the value of the vertical intercept means in the context of this problem.

   e. What would the cost be to rent a $4{,}200ft^2$ shed?

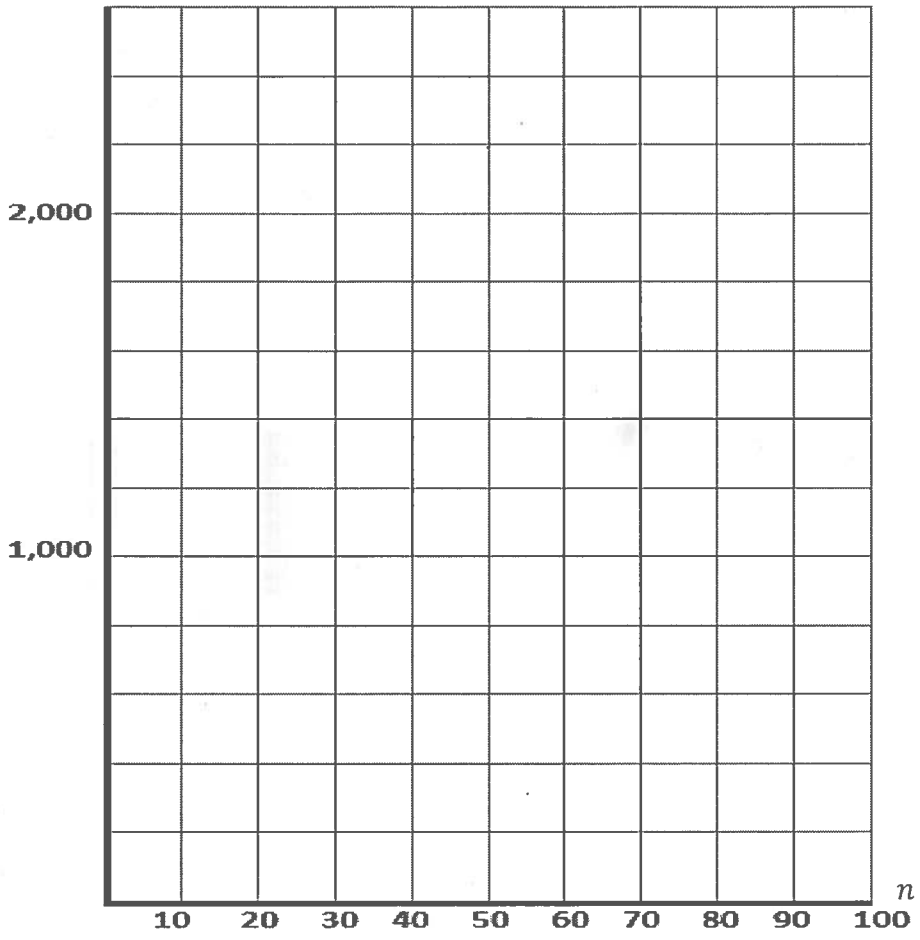
3. *(10 points)* It costs the *Dragon Fly* punk band \$480 to pay to rent a concert hall and additional \$17 per ticket fee, represented by the cost function

$$C(n) = 480 + 17n$$

where n is the number of tickets. They sell each ticket for \$25 represented by the revenue function

$$R(n) = 25n$$

a. Graph the cost and revenue on the axes below.



b. Based on your graph, estimate how many tickets the *Dragon Fly* need to sell before making a profit (revenue exceeds costs)?

4. *(20 points)* Abigail tosses a coin off a bridge into the stream below. The distance, in feet, the coin is above the water is modeled by the equation

$$f(x) = -16x^2 + 96x + 112$$

Where x represents time in seconds.

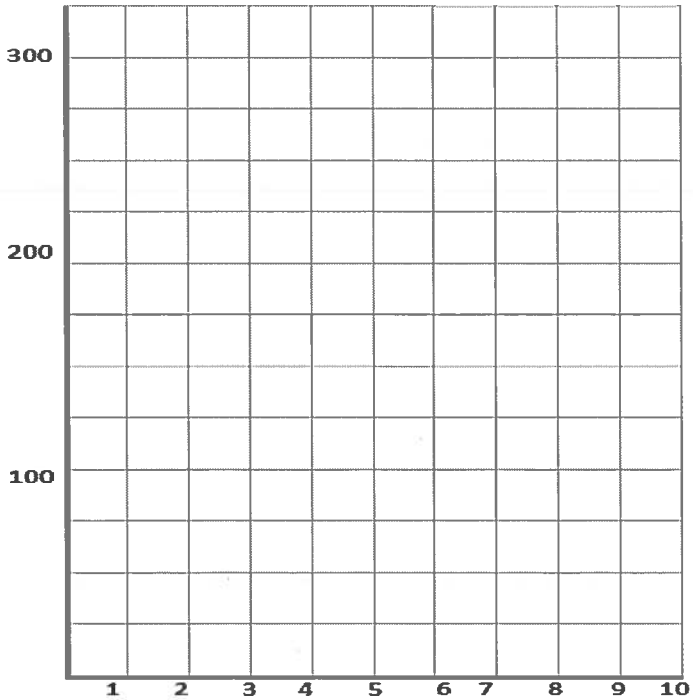
a. Put this function in vertex form by completing the square.

b. What was the maximum height of the coin?

c. When did the coin reach its maximum height?

d. If the coin does not get hit during flight, when does it hit the water?

e. Sketch a graph of the coin's path, make sure you correctly label your axis.



5. *(12 points)* Given line L: $3x - 2y = 5$

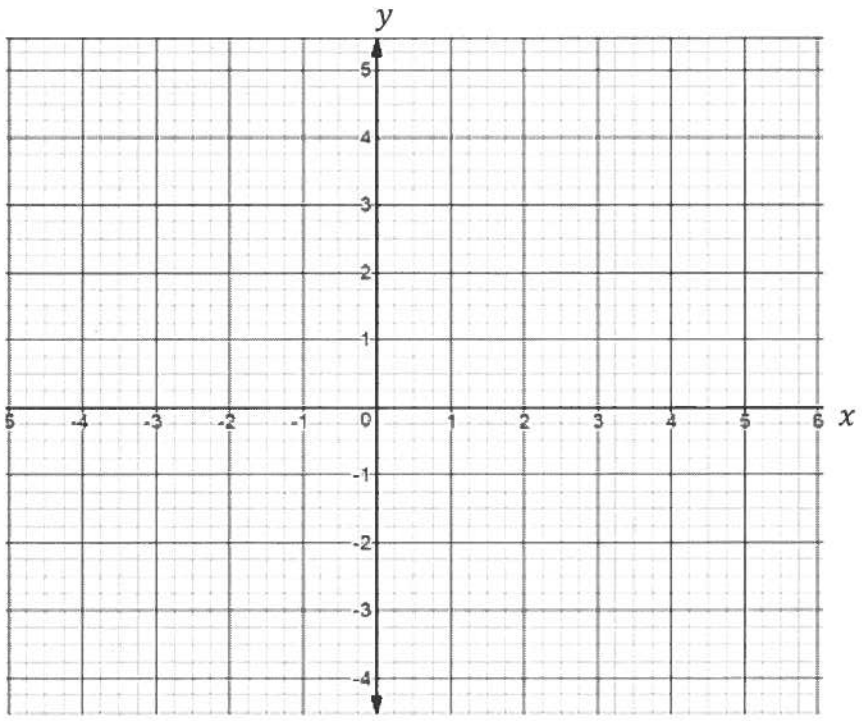
   a. What is the slope of line L?

   b. Write the equation (in slope-intercept form) of the line **parallel to line L** through the point $(6, 3)$.

   c. Write the equation (in point-slope form) of the line **perpendicular to line L** through the point $(-3, 5)$.

6. *(14 points)* Graph the following piecewise function over the indicated domain.

$$f(x) = \begin{cases} x + 1, & x < 1 \\ 1, & 1 \le x < 3 \\ x - 3, & x \ge 3 \end{cases}$$



Bonus Question:

Evaluate the difference quotient for the given function. Simplify your answer.
(you will need to simplify the complex fraction)

$$f(x) = \frac{x+3}{x+1}, \text{ and } \frac{f(x)-f(1)}{x-1}$$