Math 120
Spring 2017

Exam 2

Name: _____
M. Moreno

(10pts) **1.** Consider the function $f(x) = 2x^2 - 4x - 16$.

a) Put f in vertex form **by completing the square** (show your work).

b) Plot and label the vertex.

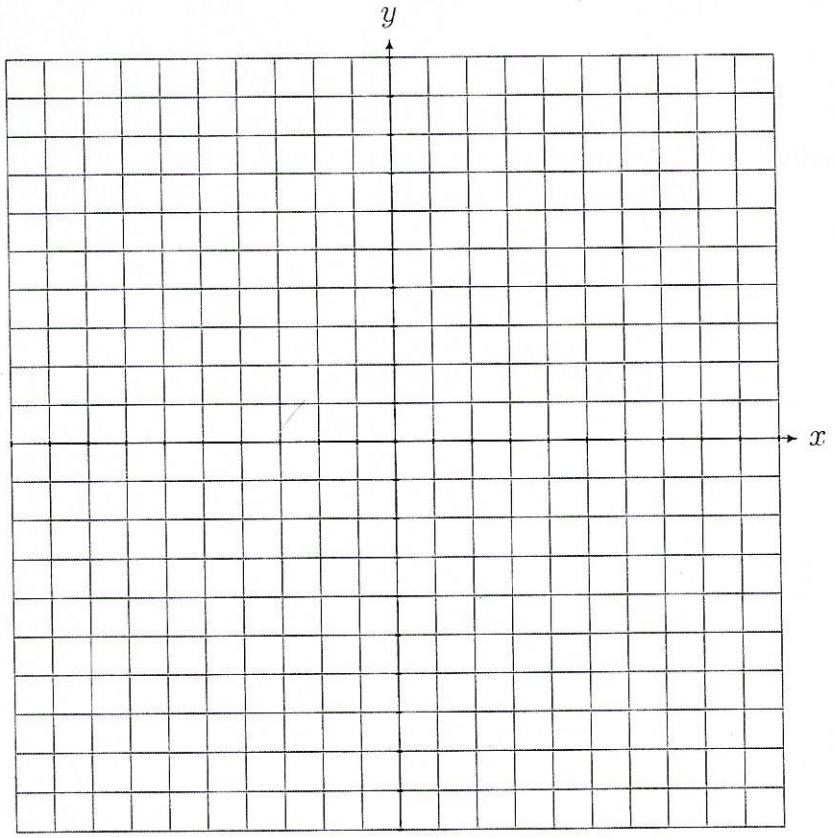
c) Graph and label the axis of symmetry.

d) Find the zeros of f (show your work).

e) State the y-intercept.

f) State the domain and range of f.

g) Create a properly scaled coordinate system appropriately and draw a nice sketch of f.



(10pts) **2.** Suppose we 2100 yards of fencing and want to create a plot of land against a river with the most area possible. Suppose no fencing is needed on the side along the river.

Determine the dimensions of the goat pen AND the maximum area that can be created with 2100 yards of fencing. You must set up the equations and solve algebraically for full credit.

Don't forget to label your answers with the appropriate units.

(10pts) **3.** Suppose Jim Bob can paddle In still water at a speed of 6 mph. If they can paddle 2 miles upstream in the same amount of time it as it takes to paddle 7 miles downstream, what is the speed of the current? (*Hint: distance* $=$ *rate* $\cdot$ *time*)

(10pts) **4.** Solve for x:

$$\frac{7x}{x+3} - \frac{4}{2-x} = \frac{x+8}{x^2+x-6}$$

(10pts) **5.** Joe Schmoe has a 15 in. by 18 in. piece of cardboard. He cuts four squares, one from each corner of the cardboard in order to make a box to put his tools in.

a) Draw a picture to depict the problem at hand.

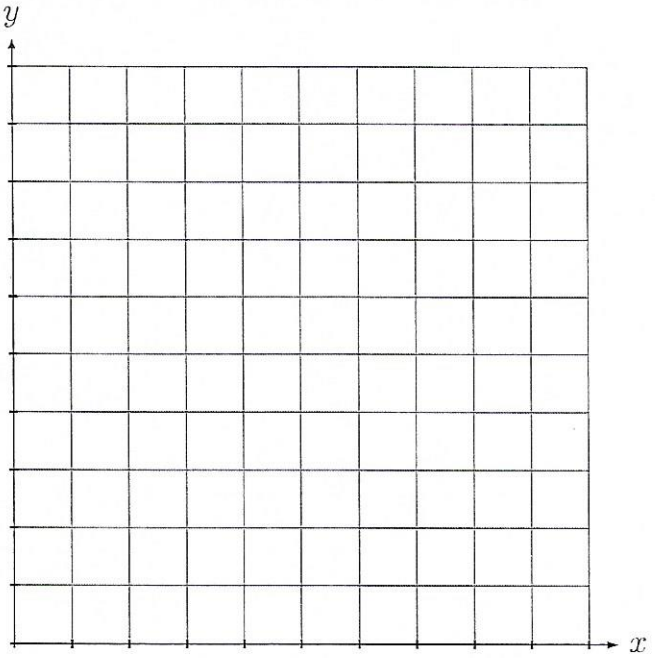
b) Let x be the length of the edge of each square cut from corners. Set of an equation that determines the volume of the box as a function of x.
(*Hint:* $volume = length \cdot width \cdot height$)

c) State the empirical domain for the function created in part (b).

d) Use your calculator to sketch the function over the empirical domain and copy that onto the coordinate system provided. Make sure you label and scale the coordinate system.

e) Use the maximum utility on your calculator to find the maximum volume of the box. What is the maximum volume?

f) What are the dimensions of each of the four squares cut from corners to create the box?



(10pts) **6.** Simplify and state restrictions:

$$\frac{x^2-6x-27}{x^2+10x+24}\cdot\frac{x^2+13x+42}{x^2-11x+18}$$

(10pts) **7.** Simplify and state restrictions:

$$\frac{2x-x^2}{x^2-15x+54}\div\frac{x^2+x}{x^2-11x+30}$$

(10pts) **8.** Simplify and state restrictions:

$$\frac{4x^2}{x-2}+\frac{36x-56}{2-x}$$

(10pts) **9.** Simplify and state restrictions:

$$\frac{5x}{x^2 - x - 12} + \frac{15}{x^2 + 13x + 30}$$

(10pts) **10.** Consider the function $f(x) = -x^4 + 4x^3 + x^2 - 4x$.

a) Is this function increasing or decreasing? Why?

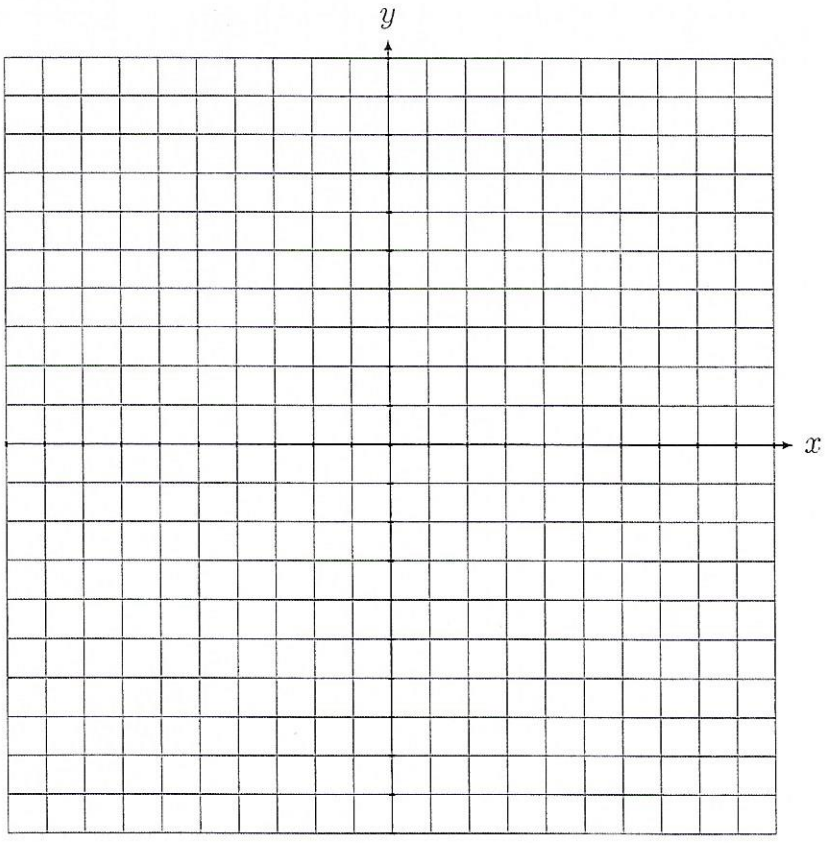
b) Does this function have the same or opposite end behavior? Why?

c) Find the zeros of the function algebraically.

d) Determine the y-intercept.

e) Use your calculator to find the vertices. State whether each vertex is a minimum or maximum and whether it is a local or absolute.

f) Using parts a-e scale the following coordinate system appropriately and draw a nice sketch of f.



(10pts) **11.** Extra Credit: Consider the function $f(x) = \dfrac{2x^2 - 3x - 5}{x^2 - x - 6}$.

a) Simplify f and state any and all vertical asymptotes and holes that exist.

b) Determine the horizontal asymptote and explain the method you used to find it.

c) Find any zeros that exist.

d) Find the y-intercept.

e) Using parts a-c scale the following coordinate system appropriately and draw a nice sketch of f.