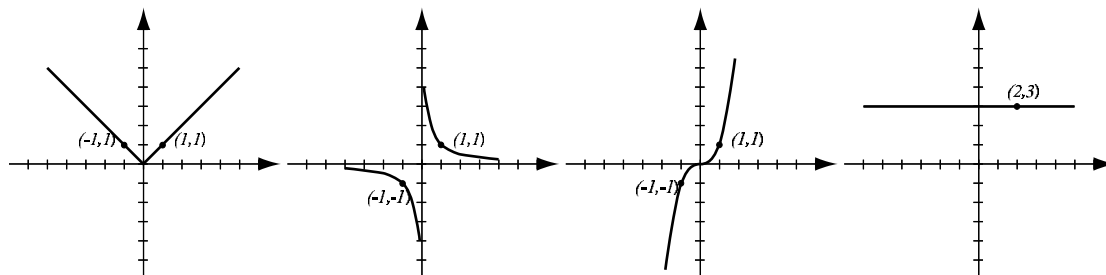


1. (4pts) The following are graphs of basic functions. Write the equation of the graph under each one.



2. (5pts) Let  $f(x) = 3x + 7$  and  $g(x) = \frac{5}{x^2 + 2x + 3}$ . Find the following and simplify where possible:

$$g(-1) =$$

$$f(2u + 4) =$$

$$\left(\frac{f}{g}\right)(x) =$$

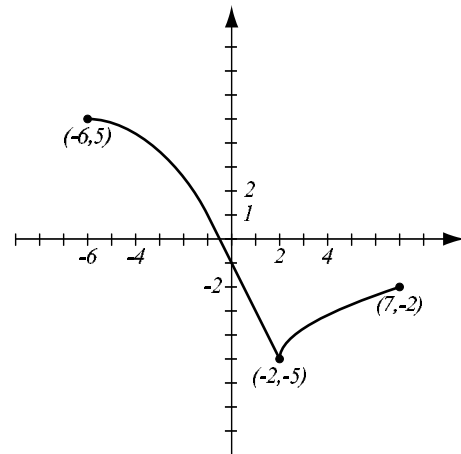
3. (6pts) The manager of a large clothing store wishes to find a function that relates the daily demand  $D$  for men's jeans and the price  $p$  of the jeans. The data below were obtained based on a price history of jeans sales.

- Draw the scatterplot of the data on paper. Does the relationship look linear?
- Use the calculator to find the "line of best fit" to the data. Draw the line on paper.
- Interpret the slope of the line of best fit.
- How many jeans would the store expect to sell daily if the price is \$25?

$p$ (\$/pair)	$D$ (pairs of jeans sold per day)
20	60
22	57
23	56
23	53
27	52
29	49
30	44

4. (6pts) Use the graph of the function  $f$  at right to answer the following questions.

- What is  $f(3)$ ?
- What are the  $x$ -intercepts?
- Where is the function increasing?
- Where does  $f$  have a local minimum? What is its value?
- What are the solutions of the equation  $f(x) = 9$ ?

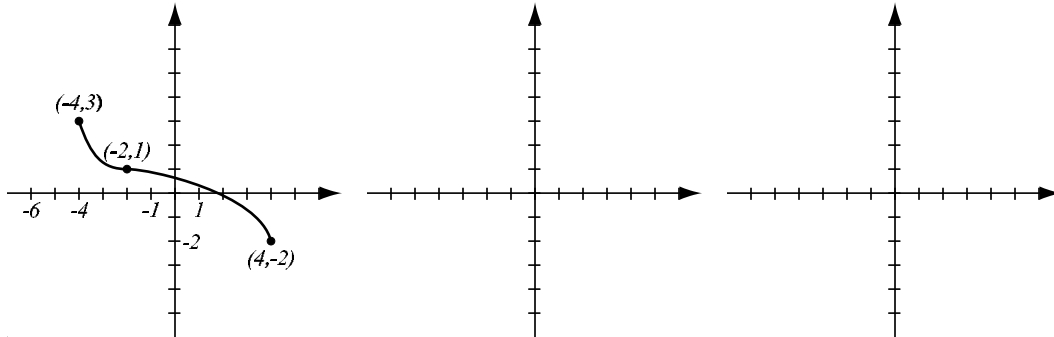


5. (3pts) Algebraically determine if the function  $f(x) = \frac{x^2 + 2}{x^3 + 4x}$  even, odd or neither.

6. (7pts) The quadratic function  $f(x) = -x^2 + 6x + 7$  is given. Do the following without using the calculator.

- Find the  $x$ -intercepts of its graph, if any.
- Find the vertex of the graph.
- Sketch the graph of the function.
- What is the range of the function?

7. (4pts) The graph of  $f(x)$  is drawn below. Find the graphs  $f(x) - 3$  and  $f(2x)$  and label all the relevant points.



8. (8pts) Consider the rational function  $f(x) = \frac{2x - 5}{x^2 - 7x + 10}$ .

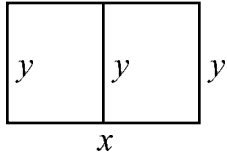
- Find the domain of the function and the vertical asymptotes.
- Algebraically find the  $x$ -intercepts of the graph and the  $y$ -intercept.
- Sketch the graph of the function on paper (large and clear — make Mom proud!).
- Find the horizontal asymptote of the graph.

9. (7pts) Farmer George has 300ft of fencing that he will use to enclose a rectangular pen and divide it in half (picture).

a) Express the area  $A$  of the pen as a function of the width  $x$ .

b) Draw a rough graph of the function  $A(x)$ .

c) Algebraically find the dimensions of the pen that maximize its area.



**Bonus** (5pts) Algebraically find the domain of  $g(x) = \sqrt{x^2 - 3x - 5}$ . (*Hint: a graph of  $x^2 - 3x - 7$  will help.*)