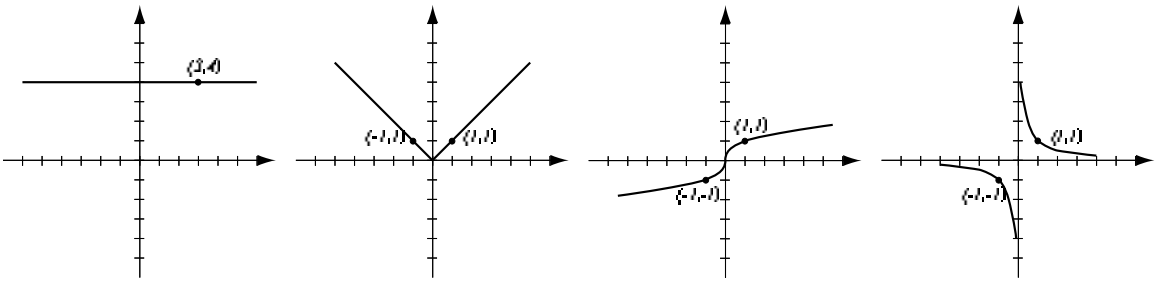
Fall '09/MAT 140/Exam 2 Name: *Show all your work.*

1. (8pts) The following are graphs of basic functions. Write the equation of the graph under each one.

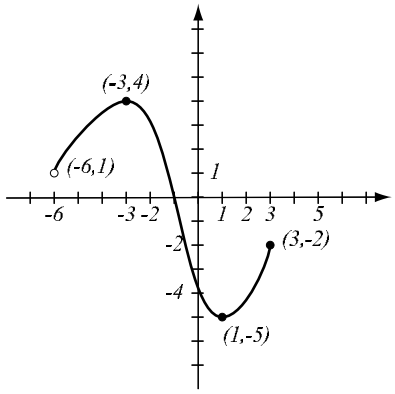


2. (14pts) Solve the inequalities and write the solution using interval notation:

$4 < 5 - 3x \leq 17$ $|x - 4| \geq 10$

3. (8pts) Write the equation of the circle centered at $(-1, 4)$ and passing through $(1, 3)$.

4. (8pts) Use the graph of the function f at right to answer the following questions.
a) What is the domain of f?
b) What is the range of f?
c) Find $f(-6)$ and $f(3)$.
d) What are the solutions of the equation $f(x) = -1$?



5. (12pts) Let $A = (1, 4)$ and $B = (-5, 2)$.
a) Find the midpoint M of A and B.
b) Find the slope of the line through A and B.
c) Write the equation of the line that passes through the midpoint M and is perpendicular to the line through A and B.
d) Sketch a picture.

6. (24pts) Let $f(x) = -x^3 + 6x^2 - 5x + 9$ (answer with 4 decimal points accuracy).
a) Use your graphing calculator to accurately draw the graph of f (on paper!). Indicate scale on the graph.
b) Determine algebraically whether f is even, odd, or neither. Justify your answer further by examining the graph.
c) Find the x- and y-intercepts.
d) Find where f has a local minimum and maximum.
e) Find the intervals of increase and decrease.
f) Find all x for which $f(x) < 0$.

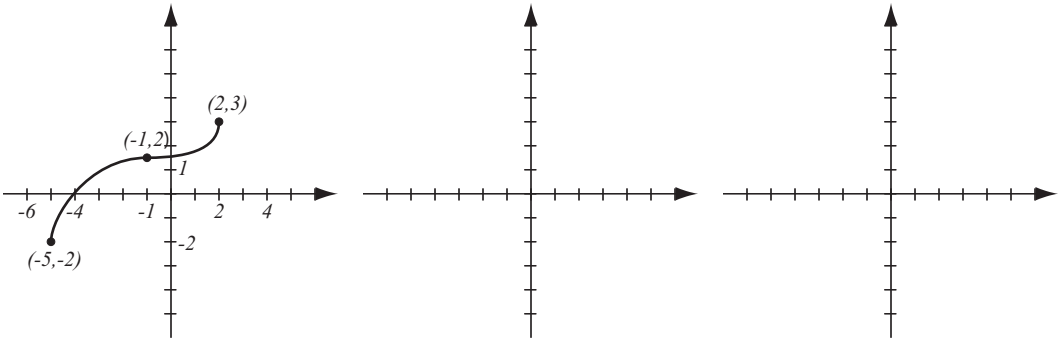
7. (6pts) Find the domain of the function $g(x) = \dfrac{7 - 4x}{5x + 6}$.

8. (10pts) Let $f(x) = 3x^2 - 4x + 7$, $g(x) = 2x - 5$. Determine the following and simplify where possible:

$f(2) =$ $\qquad\qquad$ $g(\sqrt{a}) =$

$f(x+3) - g(3x+1) =$

9. (10pts) The graph of $f(x)$ is drawn below. Find the graphs of $f(x-2)$ and $1.5f(x)$ and label all the relevant points.



Bonus (10pts) Let $A = (1, 4)$ and $B = (-5, 2)$, as in problem 5. Show that all points P in the plane whose distance to A and B is equal form a line. Find the equation of this line and compare your answer to problem 5. *(Hint: let $P = (x, y)$, write $d(P, A) = d(P, B)$ using coordinates and simplify this equation.)*