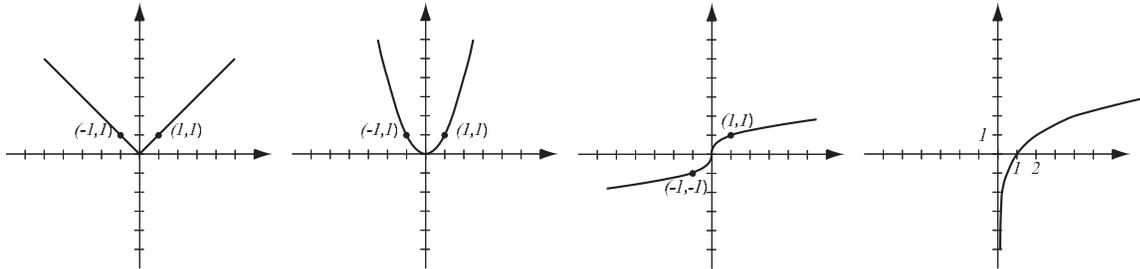


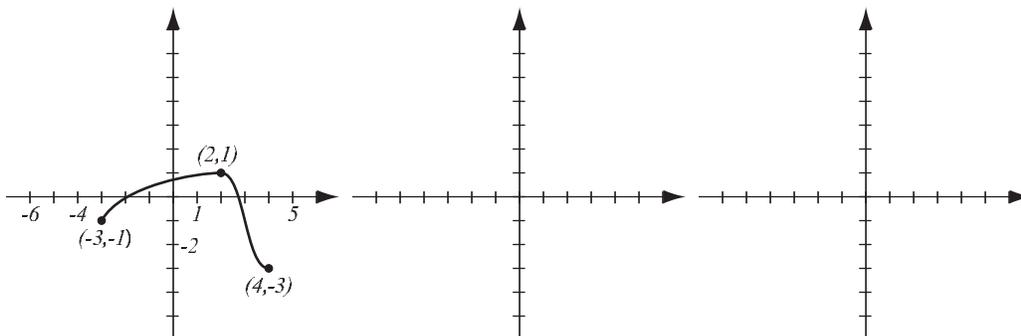
1. (8pts) The following are graphs of basic functions. Write the equation of the graph under each one.



2. (5pts) Find the equation of the line (in form $y = mx + b$) that passes through $(3, 1)$ and $(-2, 5)$.

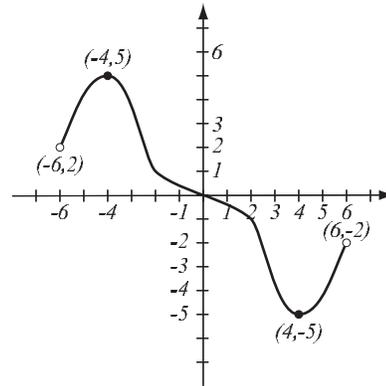
3. (6pts) Is the triangle with vertices $A = (-3, 1)$, $B = (7, 0)$ and $C = (0, 5)$ a right triangle? Use either the distance formula or slopes of perpendicular lines to find out.

4. (8pts) The graph of the function f is given below. On separate graphs, sketch the graphs of the functions $f(x + 3)$ and $-2f(x)$. Label all the relevant points.



5. (10pts) Use the graph of the function f at right to answer the following questions.

- Find $f(4)$ and $f(6)$.
- What is the range of f ?
- Is the function odd, even or neither? How can you tell?
- Where does f have a local maximum? What is its value?
- What are the solutions of the equation $f(x) = 3$?



6. (6pts) Solve the inequality. Draw the solution and write it in interval form.

$$|x + 4| \geq 5$$

7. (12pts) The quadratic function $f(x) = 4x^2 - 8x - 21$ is given. Do the following without using the calculator.

- Find the x - and y -intercepts of its graph, if any.
- Find the vertex of the graph.
- Sketch the graph of the function.

8. (14pts) The polynomial $f(x) = (x - 3)^2(x + 4)^2$ is given.

a) What is the end behavior of the polynomial?

b) List all the zeros and their multiplicities. Find the y -intercept.

c) Use the graphing calculator along with a) and b) to sketch the graph of f (yes, on paper!).

d) Find all the turning points (i.e., local maxima and minima).

9. (7pts) Simplify and write the answer so all exponents are positive:

$$\frac{(3x)^3(x^2y^{-1})^5}{18x^2y^{-4}} =$$

10. (8pts) Simplify.

$$\frac{2x - 1}{x^2 + x - 42} + \frac{x}{x^2 - 36} =$$

11. (5pts) Let $f(x) = 8x^3 - 5$. Find $f^{-1}(x)$.

Solve the equations.

12. (8pts) $3^{2x+5} = 7^{4x-1}$

13. (8pts) $x = 3 + \sqrt{-4x + 12}$

14. (5pts) Write as a sum and/or difference of logarithms. Express powers as factors. Simplify if possible.

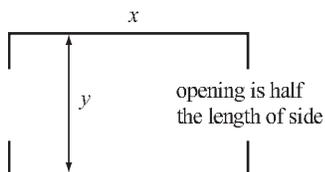
$$\log \frac{100x^4}{y^3} =$$

15. (14pts) Alison and Mitch bicycle along the same road. It takes Mitch 30 minutes to travel the road. Alison leaves 5 minutes after Mitch, but gets to the end of the road at the same time as Mitch because she travels 2.5 mph faster than Mitch.

- a) What are the speeds of the cyclists?
- b) How long is the road?

16. (14pts) A trucking company wishes to build a service garage for trucks that has openings on two sides that are half the length of the sides (see picture). They have enough money for 1800 feet of walls and wish to maximize the area of the service garage.

- a) Express the area of the garage as a function of the length of one of the sides x . What is the domain of this function?
- b) Graph the function in order to find the maximum (no need for the graphing calculator — you should already know what the graph looks like). What are the dimensions of the garage that has the biggest possible area?



- 17.** (12pts) The population of Orlando, FL was 128,000 in 1980 and 238,000 in 2010. Assume that it has grown according to the formula $P(t) = P_0e^{kt}$.
- Find k and write the function that describes the population at time t years since 1980. Graph it on paper.
 - Find the predicted population in the year 2015.

Bonus (10pts) Let $f(x) = x^2 - 6x$, considered for $x \leq 3$.

- Sketch the graph of f and verify that the function is one-to-one.
- Find the formula for the inverse of this function.