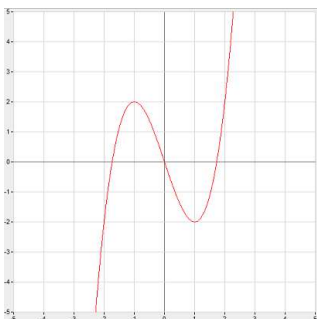


5. The graph in the figure below is the graph of a function $f(x)$. On what intervals is $f(x)$ increasing? On what intervals is $f(x)$ decreasing? At what values of x does $f(x)$ have local minima? At what values of x does $f(x)$ have local maxima? (Note that there are four questions to answer here; please label your answers clearly.)



6. Find an equation for the line through the points $(-1, 5)$ and $(7, -1)$. Any form of the equation will do. Show your work.

7. Find the center and radius of the circle whose general-form equation is $x^2 + y^2 + 8x - 10y + 32 = 0$. Show your work.

8. Below is a partial table of values for a function $f(x)$. Based on the data in the table, is this function linear? Explain your answer.

x	13	15	17	19	21
$f(x)$	106	114	124	136	150

M305G – Precalculus
Summer II 2008
Exam 1 – Part II

Instructions: Part II consists of four problems, each worth a total of 15 points. You may use a calculator and a page of notes on this part. Please show all your work. If you need extra room, you may use the back of a page, but be sure to let me know that I should look there.



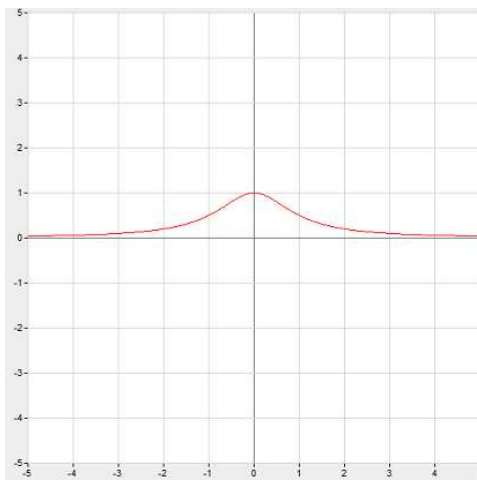
9. Consider the triangle $\triangle ABC$ in the coordinate plane with vertices $A = (0, 0)$, $B = (4, 2)$, and $C = (1, 8)$.
- (a) Sketch the triangle $\triangle ABC$.
 - (b) Use the Pythagorean Theorem to show that $\triangle ABC$ is a right triangle.
 - (c) Use slopes to show that $\triangle ABC$ is a right triangle.

10. Consider the function $f(x)$ defined by

$$f(x) = \begin{cases} -2x - 1 & \text{if } x < 0 \\ x^2 - 1 & \text{if } x \geq 0 \end{cases}$$

- (a) Find the intercepts of the graph of $f(x)$.
- (b) Draw the graph of $f(x)$.
- (c) Use the graph of $f(x)$ to find the range of the function.

11. The figure below shows the graph of the function $f(x) = \frac{1}{1+x^2}$. Use graph transformations to produce the graph of the function $g(x) = \frac{3}{1+4x^2} - 1$. At each step of the transformation process, state the transformation you're using, draw a new graph, and write the formula for the function that you are graphing. (Obviously, if you have a graphing calculator, you can use it to see what the graph of $g(x)$ looks like. So your work is far more important than your final answer here.)



12. Aside from his teaching gig, Cody runs a small but successful tutoring business. Cody knows that if he charges x dollars per hour for his services, the demand for his services is given by the demand function

$$D(x) = 1000 - 20x,$$

where $D(x)$ is the number of hours of tutoring Cody's customers (as a whole) are willing to "buy" at x dollars per hour. Answer the following questions:

(a) Let $R(x)$ be the amount of money Cody will earn if he prices his services at x dollars per hour, and gives his customers all the tutoring they are willing to pay for. Write a formula for $R(x)$ in terms of x .

(b) What price should Cody charge for an hour of tutoring in order to maximize his revenue? What is the greatest amount of revenue Cody can earn?

(c) Suppose that Cody has to pay two dollars per hour of tutoring for transportation and supplies. What price should Cody charge for an hour of tutoring in order to maximize his net profit (revenue minus operating costs)?