

5. Find the intercepts of the graph of the function $g(x) = \frac{x^2-1}{x^2+4}$. Show your work.
6. Find the average rate of change of the function $h(x) = x^2 + 3x + 1$ from $x = 2$ to $x = 5$. Show your work.
7. Find the minimum value of the function $f(x) = x^2 + 8x - 1$. Show your work.
8. If the points $(2, 4)$ and $(6, 2)$ both lie on the graph of the equation $(x - h)^2 + (y - k)^2 = r^2$, where h , k , and r are real numbers and $r > 0$, what is the smallest possible value of r ? Explain your answer.

M305G – Precalculus
Summer II 2008
Practice 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. The company Eulercorp has a plant in Austin where it manufactures calculators to be sold to precalculus students across America. The annual costs of operating this plant are \$318,000 per year, and the cost of producing one calculator is \$13. Eulercorp sells its calculators for \$79 each. For purposes of this problem, assume that Eulercorp sells all of the calculators it makes.
- (a) Give formulas for the cost function $C(x)$ and the revenue function $R(x)$, where x is the number of calculators produced and sold in one year.
- (b) How many calculators must Eulercorp sell in one year in order to break even (that is, to make up the cost of operating the plant and producing the calculators)?
- (c) How many calculators must Eulercorp sell in one year in order to generate a net profit of one million dollars?

10. Beginning with the function $f(x) = |x|$, use graph transformations to produce the graph of the function $g(x) = -|2x - 5|$. 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.)

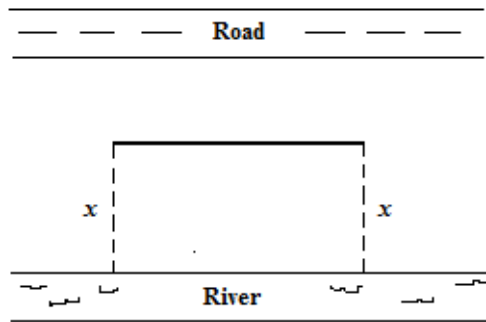
11. Consider the triangle $\triangle ABC$ in the coordinate plane with vertices $A = (-3, 1)$, $B = (2, 2)$, and $C = (-2, 6)$.

(a) Sketch the triangle $\triangle ABC$ in the coordinate plane.

(b) Show that $\triangle ABC$ is isosceles.

(c) Find the area of $\triangle ABC$. (*Hint:* Because the triangle is isosceles, the median from the vertex angle is perpendicular to the side that it bisects. The vertex angle is the angle between the two equal sides.)

12. Farmer Tim plans to fence in a rectangular plot of land that lies between a river and a highway. Tim can claim as much land as he wants; the only restriction is that he must be able to build a fence around whatever he takes. Tim plans to use the river as one side of his plot of land, and build fences along the other three sides. For the sides of the plot not facing the road, Tim plans to use a cheap fencing material (represented in the diagram by dashed lines) that costs \$3 per foot. For the side of the plot that faces the road, Tim plans to use a more expensive fencing material (represented in the diagram by a solid line) that costs \$5 per foot. Tim's total fencing budget is \$10,000.



- (a) Assume that the two sides of the plot that run between the river and the road are each x feet long. What is the total cost, in dollars, of the fencing material Tim needs to buy for these two sides?
- (b) With the money Tim has left, how many feet of fencing material can Tim buy for the side of the plot that faces the road?
- (c) In terms of x , what is the area of the rectangular plot that Tim fences in?
- (d) What value of x (that is, what length for the sides of the plot that run from the river to the road) should Tim choose so that he can fence in as much land as possible? (Assume that the plot of land is far away from the road, and Tim can take x to be as large as he wants.)