

This assignment is due by 3:30 pm on February 5, 2009 You can turn it in to me in class or drop it by the office, **Blocker 640D**. Be sure that you follow the homework rules, they can be found on your syllabus. Please work the problems in the order that they are listed.

Give all answers to at least 4 decimal digits. Be careful to not round intermediate steps since this can cause problems with your final answer.

1. Find the domains of these functions.

$$(a) f(x) = \begin{cases} x^2 - 4 & \text{if } x \geq 2 \\ \frac{x}{x^2 - 2x - 8} & \text{if } -3 \leq x < 2 \\ \frac{1}{x - 5} & \text{if } x < -3 \end{cases}$$

$$(b) g(x) = \begin{cases} \frac{5x + 1}{\sqrt[3]{x + 2}} & \text{if } x \leq 0 \\ \frac{3}{x - 5} & \text{if } x > 0 \end{cases}$$

2. Graph this piecewise function.

$$f(x) = \begin{cases} -4x + 1 & \text{if } x < -3 \\ 3 & \text{if } -3 \leq x < 2 \\ 4x - 5 & \text{if } x \geq 2 \end{cases}$$

3. Graph this piecewise function.

$$g(x) = \begin{cases} -(x - 3)^2 + 5 & \text{if } x > 1 \\ -2x + 3 & \text{if } x \leq 1 \end{cases}$$

4. A cell phone plan has a monthly base rate of \$10 that includes one hour of calls that can be made. Any additional time (including fractional minutes) over 1 hour are charged at a rate of 12 cents per minute. Find a formula that will give the monthly cell phone bill for a customer that uses x minutes.
5. Find the vertex and the range for each of the parabolas. Clearly label you answers.

(a) $y = 0.25x^2 - 18x + 71$

(b) $y = -10x^2 - 2x + 83$

6. A company is planning on producing and selling a new computer system and has determined that the cost per computer system for producing x computer systems in a month can be modeled by the formula $\overline{C}(x) = 0.0015x^2 - 3.75x + 2730$.

(a) What monthly level of production would be needed to minimize the cost per system.

(b) What monthly production level(s) would have a cost per computer system of \$500? Round to the nearest item.

(c) What would be the total cost for producing 1000 computer systems during a given month?

7. A company believes it can model the demand of a new product by $p = -6x + 112.5$ where p is the price at which x thousand sprockets can be sold. They anticipate that the cost, in thousand of dollars, to produce x **thousand sprockets** can be modeled by $C(x) = 19.8x + 168$.

(a) How many sprockets should be produced to maximize the revenue? (be carefull with units)

(b) How many sprockets should be produced to maximise the profit? What is the maximum profit?

(c) At what production level would the company break even? Round answers to the nearest sprocket.