

MCS 118

Word Problems

1. A bus company charges \$20 per person for a bus trip, with a minimum of 25 people to schedule the trip. In an attempt to increase its revenue, the company is offering tours at a discount. Whenever more than 50 people charter a bus, the price per person is reduced by \$.25 for each additional person beyond 50 persons.
 - (a) What is the company's revenue if 25 people make the trip? If 50 people do? Write a formula that gives the revenue, assuming that the number of people is between 25 and 50.
 - (b) What is the company's revenue if 51 people make the trip? 60? Write a formula for the company's revenue assuming that more than 50 people make the trip.
 - (c) Find a piecewise-defined function, $R(x)$, for the company's revenue, assuming that x people make the trip.
 - (d) Graph this function. What is the domain?
2. Tom has a rectangular yard that is 30 ft by 34 ft. He would like to add a sidewalk along the outside of two adjacent sides of the yard. (Note: both Tom and Barbara have houses on corner lots.) The contractor quotes a price of \$20 per square foot to put in the sidewalk.
 - (a) If the sidewalk is only 1 foot wide, how many square feet would Tom need? What would he pay the contractor?
 - (b) If the sidewalk is 3 feet wide, how much would Tom have to pay?
 - (c) Write a function, $C(x)$, that gives the cost of installing a sidewalk that is x feet wide.
3. The cost C in dollars to produce x bracelets is given by the function $C(X) = 0.05x^2 + 2x + 10$. What is the average rate of change in the cost of producing a bracelet if production is increased from 10 to 20 bracelets?

4. If a ball is dropped from a 200-ft tower, its height above the ground after t seconds is given by the function $s(t) = 200 - 16t^2$.
- (a) What is the average velocity of the ball between 0 and 2 seconds?
 - (b) How long will it take for the ball to hit the ground?
 - (c) Calculate the average velocity of the ball for its whole drop (from the time it is dropped until it hits the ground).
5. Owners of an inactive quarry in Australia have decided to resume production. They estimate that it will cost them \$1000 per month to maintain and insure their equipment and that monthly salaries will be \$3000. It costs \$80 to mine a ton of rocks. Write a formula that expresses the total cost each month as a function of the number of tons of rock mined per month.
6. A yeast culture grows according to the equation

$$Y = \frac{50000}{1 + 250 \cdot (.737)^t}$$

where y is the number of yeast and t is the time in hours.

- (a) Use your calculator to graph this equation for $t \geq 0$.
- (b) Use the graph to estimate the number of hours before the yeast population reaches 35,000.
- (c) From the graph, estimate the maximum population of the yeast.