

**Math 0120 Homework\_07 is due : 08/29/2012 at 02:12pm EDT.**

**Reference:** Berresford, Sections 3.5, 3.6

1. (1 pt) Find  $dy/dx$  in terms of  $x$  and  $y$  if  $x^5y - x - 7y - 14 = 0$ .

$\frac{dy}{dx} =$  \_\_\_\_\_

2. (1 pt) Find the slope of the tangent to the curve  $x^4 + xy + y^2 = 7$  at  $(1, 2)$

slope = \_\_\_\_\_

(Enter **undef** if the slope is not defined at this point.)

3. (1 pt) Suppose that two boats leave a dock at different times. One heads due north, the other due east. Find the rate at which the distance between the boats is changing when the first boat is 32 miles from the dock traveling at a speed of 35 miles per hour and the second boat is 51 miles from the dock traveling at a speed of 32 miles per hour.

Answer: \_\_\_\_\_

4. (1 pt) A boat is pulled into a dock by a rope attached to the bow of the boat and passing through a pulley on the dock that is 1 m higher than the bow of the boat.

If the rope is pulled in at a rate of 1.4 m/s, how fast is the boat approaching the dock when it is 7 m from the dock?

Rate = \_\_\_\_\_

5. (1 pt) Oil spilled from a ruptured tanker spreads in a circle whose area increases at a constant rate of  $6.5 \text{ mi}^2/\text{hr}$ . How rapidly is radius of the spill increasing when the area is  $7 \text{ mi}^2$ ?

The radius is increasing at \_\_\_\_\_ mi/hr.

6. (1 pt) A spherical balloon is inflated so that its volume is increasing at the rate of  $2.2 \text{ ft}^3/\text{min}$ . How rapidly is the diameter of the balloon increasing when the diameter is 1.8 feet?

The diameter is increasing at \_\_\_\_\_ ft/min.

7. (1 pt) A street light is at the top of a 12.0 ft. tall pole. A man 5.1 ft tall walks away from the pole with a speed of 6.5 feet/sec along a straight path. How fast is the tip of his shadow moving when he is 37 feet from the pole?

Your answer: \_\_\_\_\_

**Hint:** Draw a picture and use similar triangles.

8. (1 pt) A motorcycle shop sells 500 motorcycles per year. Each motorcycle costs the shop 9000 dollars. There is a fixed delivery charge of 1200 dollars for each lot of motorcycles ordered from the distributor. It costs 1400 dollars per year to store a motorcycle. How many motorcycles should be ordered in each lot in order to minimize inventory cost (storage plus reorder)? Round your answer to the nearest integer.

Answer: \_\_\_\_\_ motorcycles per lot

9. (1 pt) A machine shop manufactures custom brake disks for high performance cars. The shop needs to meet a demand of 1900 units per year. For each production run there is a setup cost of 1600 dollars, and there is a cost of 70 dollars per unit for materials and supplies. Storage of unsold units costs the shop 10 dollars per year. How many units should the shop produce on each production run in order to minimize inventory costs (setup plus storage)? Round your answer to the nearest integer.

Answer: \_\_\_\_\_ units per production run