## Calculus Worksheet #2 Unit 7

Use calculus to solve each of the following problems. Show all of your work, including an appropriate diagram, and your answer neatly organized.

1. A 15-foot ladder stands upright against a vertical wall. If the lower end of the ladder is pulled away from the wall (on level ground) at the rate of 1.5 feet per second (fps), then how fast is the angle between the ladder and the wall changing the instant the top of the ladder is 9 feet above the ground?

2. At 1:00 PM an ocean liner leaves Boston harbor and steams due east at 12 mph. At 2:00 PM on the same day a freighter leaves Boston harbor on a heading of 60 degrees south of east at 8 mph. How fast is the distance between them increasing at 4:00 PM?

3. A boat is being pulled in to a dock using a rope that passes over the edge of the dock and is attached to the boat at a point that is 8 feet lower than the level of the dock. If the rope is being pulled in at 24 feet per minute, then how fast is the boat moving when there are 17 feet of rope between the dock and the boat?

4. A light one-half mile off a straight shore rotates once every minute. How fast is the beam of light moving along the shore the instant it makes an angle of 60 degrees with the shore? (Express your final answer in feet per second.)

5. A helicopter traveling at 20 meters per second at an altitude of 200 meters flies directly overhead. How fast is the angle of elevation to the helicopter changing 10 seconds later? (Express your final answer in degrees per second.)

6. One leg of a right triangle is 10 inches long and the other leg is 4 inches long. If the length of the longer leg is increasing at the rate of 1.2 inches per second, while the length of the shorter leg remains the same, then how fast is the length of the hypotenuse increasing after 5 seconds?

7. One leg of a right triangle is 10 inches long and the other leg is 4 inches long. If the length of the longer leg is increasing at the rate of 1.2 inches per second, while the length of the shorter leg remains the same, then how fast is the area of the triangle increasing after 5 seconds?