Assignment #8

Math 180

Name:

1. A police cruiser, approaching a right – angled intersection from the north, is chasing a speeding car that has turned the corner and is now moving straight east. When the cruiser is 0.6 mi north of the intersection and the car is 0.8 mi to the east, the police determine with radar that the distance between them and the car is increasing at 20mph. If the cruiser is moving at 60 mph at the instant of measurement, what is the speed of the car?

2. A hot air balloon rising straight up from a level field is tracked by a range finder 500 ft from the liftoff point. At the moment the range finder's elevation angle is 45 degree, the angle is increasing at the rate of 0.14 rad/min. How fast is the balloon rising at that moment?

3. At noon ship A is 8 miles east of ship B. Ship A is heading north at an average speed of 7 mph, at the same time ship B is heading west at a an average speed of 5 mph. How fast is the distance between the two ships changing at 2:00pm?

4. Sand falls from a conveyor belt at the rate of $10 \text{ m}^3/\text{min}$ onto the top of a conical pile. The height of the pile is always three – eight of the base diameter. How fast are the (a) height and (b) radius changing when the pile is 4 m high?

5. A balloon is rising vertically above a level, straight road at a constant rate of 1 ft/sec. Just when the balloon is 65 ft above the ground, a bicycle moving at a constant rate of 17 ft/sec passes under it. How fast is the distance between the bicycle and balloon increasing 3 sec later?

6. A particle moves along the parabola $y = x^2$ in the first quadrant in such a way that its x-coordinate (measured in meters) increases at a steady 10 m/sec. How fast is the angle of the inclination θ of the line joining the particle to the origin changing when x = 3 m?