Problem 1

A conical tank of height 3 m and radius 4 m is sitting pointy side down and filled with water, which, is slowly draining from it. At the moment the height of the water is 2 m, the height is dropping at a rate of 1 $\frac{m}{min}$. How fast is the volume of water changing at this time?

Problem 2

A plane flies at a constant height of 2 mi above the ground. A sensor is placed in the ground that points directly at the plane at all time. At the moment the plane is 2.5 miles away from the sensor, the angle between the ground and the direction the sensor is pointing is changing at a rate of $2\frac{rad}{min}$. How fast is the plane going at this time?

Problem 3

A 10 ft ladder is leaning up against a wall. The floor makes a right angle with the wall. The base of the ladder begins to slide away from the wall at a rate of $2\frac{ft}{sec}$. How fast is the angle between the floor and the ladder changing when the base of the ladder is 4 ft. away from the wall?

Problem 4

Suppose that we fill a balloon with air at a constant rate of $1\frac{cm^3}{min}$. How fast is the surface area increasing when the radius is 10 cm?