MCS21 – Calculus
Exam 6 Review Sheet

Sample Directions (as they will appear on the exam):

The exam will consist of five questions similar to those below.

1. A stone thrown into a pond creates a circular ripple. If the radius of the circle is increasing at the rate of 2 feet per second, at what rate is the area of the circle increasing when the radius is 12 feet?

2. A certain calculus student hit Mr. Shahom in the head with a very large snowball. The snowball is melting at a rate of 10 cubic feet per minute. Assume that the snowball is a sphere whose volume is $\frac{4}{3}\pi r^3$ and whose surface area is $4\pi r^2$, where r is the radius of the snowball.
    (a) At what rate is the radius of the snowball decreasing when the snowball has a radius of 2 feet?
    (b) How quickly is the surface area of the snowball decreasing when its radius is 2 feet?

3. A ladder 10 feet long is resting against a wall. If the bottom of the ladder is sliding away from the wall at a rate of 1 foot per second, how fast is the top of the ladder moving down when the bottom of the ladder is 8 feet from the wall?

4. A rocket is launched (vertically) with a constant speed of 550 miles per hour. A video camera located on the ground 25 miles from the launch pad is recording the launch. At what rate (in radians per hour) is the angle of elevation of the video camera changing when the rocket reaches an altitude of 25 miles?

5. A water tank has the shape of an inverted circular cone with base radius 3 meters and height 5 meters. (The volume of a cone with base radius r and height h is $\frac{1}{3}\pi r^2 h$.) If water is being pumped into the tank at a rate of 2 cubic meters per minute, find the rate at which the water level is rising when the water is 3 meters deep.