MATH 2554 (Calculus I)
Summer 2015

Name: _____

Wed 24 June 2015

Quiz 7: Related Rates ($\oint$3.10)

Directions: You have 45 minutes to complete this quiz. This quiz is open book and collaborative.

1. **(#10)** A piston is seated at the top of a cylindrical chamber with radius 5 cm when it starts moving into the chamber at a constant speed of 3 cm/sec. What is the rate of change of the volume of the cylinder when the piston is 2 cm from the base of the chamber?

2. **(#19(a))** A five foot tall woman walks at 8 ft/sec toward a street light that is 20 ft tall. What is the rate of change of the length of her shadow when she is 15 ft from the street light?

3. **(#24(a))** A hemispherical bowl with a radius of 10 cm is filled with fruit punch at a rate of 3 cm^3/sec. How fast is the punch level rising when it is 5 cm deep?

   Fact: The volume of a cap of thickness h sliced from a sphere of radius r is

$$V = \frac{1}{3}\pi h^2(3r - h).$$

4. **(#38(a))** A conical tank with an upper radius of 4 m and a height of 5 m drains water into a cylindrical tank with a radius of 4 m and a height of 5 m. If the water level in the conical tank drops at a rate of 0.5 m/min, at what rate does the water level in the cylindrical tank rise when the water level in the conical tank is 3 m?