

Name \_\_\_\_\_

Calc Test Review – Related Rates

Part I - Implicitly Differentiate:

1) With respect to  $x$ :  $x^3y - 3y + 4x = 8$

2) With respect to  $t$ :  $4ab + 4c - 3d = 5c^2d$

Part II – Solve the Related Rates:

3) A 13 meter ladder rests 12 meters high on a wall. In an instant, the ladder slips down the wall at 9.8 meters per second. How fast is the base of the ladder moving away from the wall at this instant?

4) A bottle of cooking oil punctures inside a cabinet. The oil spills out slowly in a circle. At the instant the radius of the spill is 4cm, the area of the spill is increasing at a rate of 5cm per minute.

a. How quickly is the radius of the spill increasing?

b. If the cooking oil bottle is 20 cm from the edge of the cabinet, how long until the oil spills over the edge?

5) You are closing your pool for the winter. The pool is cylindrical in shape with a circumference of  $28\pi$  feet. How fast is the volume of pool water being emptied from the pool at the instant that the water level of the pool is 3 feet high?

6) The height of a cone is always 8 times its radius. If the volume of a cone is increasing at a rate of 10 feet per minute, how fast is the radius increasing when the radius is 2 feet?