ICM Applications of Derivatives   Name_____
Related Rates Homework 2   Date_____ Period_____

For each problem, use implicit differentiation to find $\dfrac{dy}{dx}$ in terms of x and y.

1) $3 = x + 3x^3y^3 + 2y^3$

2) $3x^3 = -2x^2y^3 - 2x^2y + 2$

3) $\left(3y^3 + 4\right)^2 = 3x^2$

4) $5x^2 = \left(y^3 + 2\right)^2$

Solve each related rate problem.

5) A hypothetical square grows at a rate of 81 m²/min. How fast are the sides of the square increasing when the sides are 6 m each?

6) A 5 ft tall person is walking towards a 19 ft tall lamppost at a rate of 3 ft/sec. Assume the scenario can be modeled with right triangles. At what rate is the length of the person's shadow changing when the person is 15 ft from the lamppost?

7) Water leaking onto a floor forms a circular pool. The radius of the pool increases at a rate of 9 cm/min. How fast is the area of the pool increasing when the radius is 14 cm?

8) Water slowly evaporates from a circular shaped puddle. The area of the puddle decreases at a rate of 49π in²/hr. Assuming the puddle retains its circular shape, at what rate is the radius of the puddle changing when the radius is 4 in?

9) A spherical snowball melts so that its radius decreases at a rate of 2 in/sec. At what rate is the volume of the snowball changing when the radius is 4 in?

10) An observer stands 2400 ft away from a launch pad to observe a rocket launch. The rocket blasts off and maintains a velocity of 800 ft/sec. Assume the scenario can be modeled as a right triangle. How fast is the angle of elevation (in radians/sec) from the observer to rocket changing when the rocket is 700 ft from the ground?