Name: _____ Date: _____

AP Calculus AB – Introduction to Related Rates Ms. Loughran

1. Given $y = 4x^3 - 3x^2 - 9x + 1$, find $\frac{dy}{dx}$.

2. Given $y = 4w^3 - 3w^2 - 9w + 1$, find $\frac{dy}{dw}$.

3. Given $v = 4m^3 - 3m^2 - 9m + 1$, find $\frac{dv}{dm}$.

4. Given $y = 4x^3 - 3x^2 - 9x + 1$, find $\frac{dy}{dt}$.

5. Given $P = 2L + 2W$, find $\frac{dP}{dt}$.

6. Given $A = \pi r^2$, find $\frac{dA}{dt}$.

7. Given $V = \frac{4}{3}\pi r^3$, find $\frac{dV}{dt}$.

8. Given $V = \pi r^2 h$, find $\frac{dV}{dt}$.

9. Given $V = \frac{1}{3}\pi r^2 h$, find $\frac{dV}{dt}$.

10. Given $c^2 = a^2 + b^2$, find $\frac{dc}{dt}$.

Now for our very first related rates problem….

11. Assume that oil spilled from a ruptured tanker spreads in a circular pattern whose radius increases at a constant rate of 2 ft/s. How fast is the area of the spill increasing when the radius of the spill is 60 ft?

12. A 17 ft ladder is leaning against a wall. If the bottom of the ladder is pulled along the ground away from the wall at a constant rate of 5ft/s. How fast will the top of the ladder be moving down the wall when it is 8ft above the ground?

13. A hot air balloon rising straight up from a level field is tracked by a range finder 500 ft from the lift out point. At the moment the range finder's elevation angle is $\frac{\pi}{4}$, the angle is increasing at the rate of .14 radians per minute. How fast is the balloon rising at that moment?

AP Calculus AB: Related Rates Intro Homework

1. A stone dropped into a still pond sends out a circular ripple whose radius increases at a constant rate of 3 ft/s. How rapidly is the area enclosed by the ripple increasing at the end of 10s?

2. A spherical balloon is to be deflated so that its radius decreases at a constant rate of 15 cm/min. At what rate must air be removed when the radius is 9 cm?

3. A 13-ft ladder is leaning against a wall. If the top of the ladder slips down the wall at a rate of 2 ft/s, how fast will the foot be moving away from the wall when the top is 5 ft above the ground?