Name: _____ Date: _____

AP Calculus AB: Related Rates Packet 1 Ms. Loughran

1. Consider a rectangular prism bathtub that has a base whose area is 18ft^2. How fast is the water level rising if water is filling the tub at a rate of $0.7\text{ft}^3/\text{min}$?

2. Assume that the radius of a sphere is expanding at a rate of $14\text{ in}/\text{min}$. Determine the rate at which the surface area is changing when the radius is 8 in.

3. A hot air balloon rising vertically is tracked by an observer who is located 2 miles from the lift-off point. At a certain moment, the angle between the observer's line of sight and the horizontal is $\frac{\pi}{6}$, and it is changing at a rate of 0.2 radians/min. How fast is the balloon rising at this moment?

4. Assume that the radius of the sphere is expanding at a rate of 14 in/min. Determine the rate at which the volume is changing with respect to time when the radius is 8 in.

5. A jogger runs around a circular track of radius 60ft. Let (x,y) be her coordinates where the origin is the center of the track. When the jogger's coordinates are $(36,48)$, her x-coordinate is changing at a rate of 14 ft/s. Find $\frac{dy}{dt}$.

6. A conical tank has a height of 3 m and a radius of 2 m at the top. Water flows in at a rate of 3 m^3/min. How fast is the water level rising when the height is 2m?

If you were giving advice/tips to a friend on how to approach a related rates problem, what would you say?

(Please place some of your suggestions on the large Post-it .)

And now you are ready for another one…

7. A water tank in the shape of a right circular cone has a height of 10 feet. The top rim of the tank is a circle with a radius of 4 feet. If water is being pumped into the tank at the rate of 2 cubic feet per minute, what is the rate of change of the water depth, in feet per minute, when the depth is 5 feet?