Name: _____

Math 1A Quiz Ch. 3

October 23, 2013

Write in complete sentences and show all work.

1. (4 pts) Find the derivative of $f\left(\frac{g(x)}{h(x)} + x^2\right)$ with respect to x.

2. (4 pts) Find $g'(x)$ where $g(x) = \sqrt{\cos(\sin^2 x)}$.

3. (4 pts) A particle moves on a line so that its coordinate at time t is $y = -5t^2 + 10t + \sqrt{2}$, $t \geq 0$. Find the velocity and acceleration functions.

4. (16 pts) Find the equations of the tangent line and the normal line to the curve $y = x^{\cos x}$ at $x = 2\pi$. Draw the lines in the picture of the graph below. *Hint: to find dy/dx you can use logarithmic differentiation, or you can write y as $e^{(something)}$.*
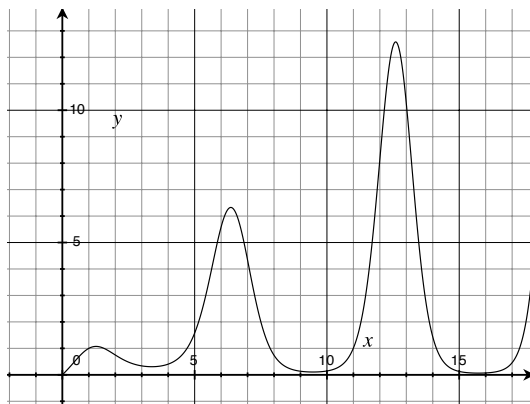
5. (10 pts) A cylindrical tank with radius 5 m is being filled with water at a rate of 3m^3/min. How fast is the height of the water increasing? *Remember to define your variables!*

6. (10 pts) A paper cup has the shape of a cone with height 10 cm and radius 3 cm (at the top). If water is poured into the cup at a rate of $2cm^3$/s, how fast is the water level rising when the water is 5 cm deep?

7. (10 pt) A ladder 13 ft long rests against a vertical wall. If the top of the ladder slides down the wall at a rate of 1 ft/s, how fast is the bottom of the ladder sliding along the floor when the top of the ladder is 12 ft from the floor?