Read each problem **very carefully** before starting to solve it. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [4 points] Find an equation for the tangent line to the curve

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

at the point $(x, y) = (1, 1)$.

(**Hint**: Use implicit differentiation to compute the derivative and find the slope.)

2. Suppose you are blowing air into a bubble-gum spherical bubble at the rate of $\frac{1}{10}$ in^3/sec. (Given are the formulas of the volume and the surface of a sphere in terms of its radius: $V = \frac{4}{3}\pi r^3$ and $S = 4\pi r^2$, respectively.)

   (a) [3 points] Find how fast the radius of the bubble is increasing, when the radius is exactly $\frac{1}{2}$ inches.

   (b) [3 points] Find how fast the surface of the bubble is increasing at the same exact moment. (**Hint:** Use the answer obtained in Part (a).)