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

1. Use implicit differentiation to find $\dfrac{dy}{dx}$ if

$$x^2 y + xy^3 = 8 + y.$$

2. A spherical air bubble is deflated. Its surface area is decreasing by 40π cm^2/sec. Find how fast its radius is changing at the instant when the radius is equal to 20 cm.

(Surface area S of sphere of radius r: $S = 4\pi r^2$.)

3. Use the one-to-one property for exponential functions to solve the exponential equation

$$9^{x^2} = 3^x \cdot 27^{1-2x}.$$