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. Suppose we have a 10in × 10in carton and we want to create a rectangular open-top box by cutting out four identical small squares from the corners and folding up the sides. Find the volume of the largest box that can be made in this way.

2. Find an equation for the tangent line to the graph of $x^2y^3 + x^3y^2 = -4$ at the point $(x, y) = (-2, 1)$.

3. A spherical balloon is being inflated so that its surface area is increasing by 10π square inches per second. Find how fast its radius is increasing, when the radius is 5 inches.

(Formula giving the surface area S of a sphere of radius r: $S = 4\pi r^2$)