Name: _____   **Score:** _____
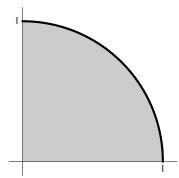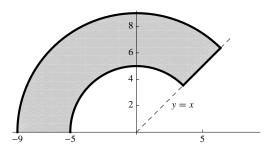
Directions. Show your work and write complete solutions or you may not receive credit. If you need more room, use the backs of the pages and indicate to the reader that you have done so.

1. (6 points) Find the volume under the surface $z = (x^2 + y^2)^2$ and above the quarter circle of radius 1 that lies in the first quadrant.

2. (4 points) Find the area of the region shown below.

3. (10 total points) Let $f(x) = x^2 + 3x - 1$.

   (a) (3 points) Find the first Taylor polynomial $T_1(x)$ for $f(x)$ based at $x = 1$.

   (b) (4 points) Use the Tangent Line Error Bound to bound the error $|f(x) - T_1(x)|$ on the interval $[0.5, 1.5]$.

   (c) (4 points) Find an interval around $x = 1$ such that the error on the interval is guaranteed to be less than or equal to 0.01. Your work should justify your answer.