

Name: KEY

Quiz Score: _____ /25

Quiz 5: Version A*Show your reasoning. Use standard notation correctly. Simplify your answers. NO CALCULATORS!*We wish to find the area A of the region bounded by the curves $y = f(x)$ and $y = g(x)$ where $f(x) = x^2$ and $g(x) = 3x$.

1. (5 pts) Find the points of intersection of the curves algebraically. (Set up and solve an equation.)

$$x^2 = 3x$$

$$x^2 - 3x = 0$$

FACTOR! $x(x-3) = 0$

$$\underline{x=0} \quad \text{or} \quad \underline{x-3=0}$$

$$\quad \quad \quad \quad \quad \underline{x=3}$$

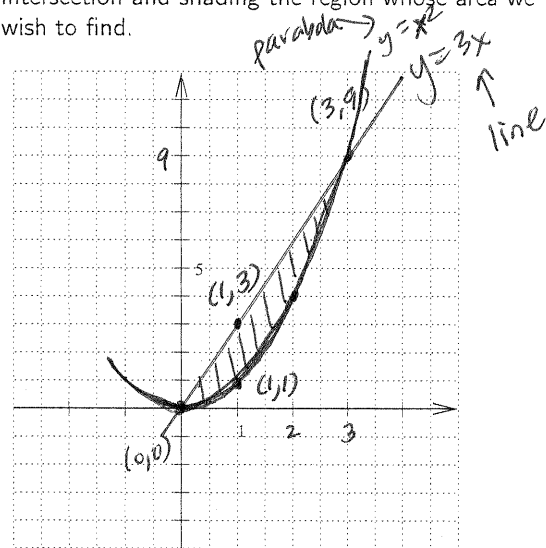
2. (5 pts) Determine algebraically which function is the "top" function on the interval determined by their points of intersection.

Test $x=1$ (or any other number in $(0,3)$.)

$$f(1) = 1^2 = 1$$

$$g(1) = 3 \cdot 1 = 3 \leftarrow \text{Top}$$

3. (5 pts) Sketch the graphs, labeling the points of intersection and shading the region whose area we wish to find.



4. (10 pts) Set up and evaluate an integral representing the area A . Write out each step using proper notation. Give an exact answer, simplified.

$$A = \int_0^3 (3x - x^2) dx$$

$$= \left(\frac{3}{2}x^2 - \frac{1}{3}x^3 \right) \Big|_0^3$$

$$= \left(\frac{3}{2} \cdot 3^2 - \frac{1}{3} \cdot 3^3 \right) - \left(\frac{3}{2} \cdot 0^2 - \frac{1}{3} \cdot 0^3 \right)$$

$$= \frac{27}{2} - 9$$

$$= \frac{27}{2} - \frac{18}{2}$$

$$= \underline{\underline{\frac{9}{2}}}$$