

**MAT 254 – Fall Quarter 2002**  
**Test 2**

NAME \_\_\_\_\_

**Show work and write clearly.**

1. (20 pts.) Sketch the region enclosed by the given curves. Sketch the area.

$$f(x) = x^2 + 1 \text{ and } g(x) = 3 - x^2 \text{ between } x = -2 \text{ and } x = 2.$$

2. (20 pts.) a. Find the average value of  $f(x) = \frac{\ln x}{x} + 1$  from  $x = 1$  to  $x = 2$ .

b. Find  $c$  such that average value of  $f$  equals  $f(c)$ . Explain.

c. Sketch the graph of the function and a rectangle whose area is the same as the area under the graph of  $f$ .

3. (20 pts.) Use the disk method to find the volume of the solid formed by revolving the region between  $y = x^2$  and  $y = x^3$  about the  $x$ -axis. Sketch the area.

4. (20 pts.) Use the disk method to find the volume of the solid formed by revolving the region between  $x = y^2$ , the  $x$ -axis and  $x = 4$  about the line  $x = 6$ . Sketch the area.

5. (20 pts.) Use the shell method to find the volume of the solid formed by revolving the region between  $y = x^2$  and  $y = 4x - x^2$  about the line  $x = 4$ . Sketch the area.