Math 272
Applications of Integrations

Solve:

1. Find the area of the region bounded by the graph of \( y = 4 - 4x^2 \) and the x-axis.

2. Find the area of the region bounded by the graphs of \( y = -x^2 + 2x + 3 \) and \( y = 3 \).

3. Find the area of the region bounded by the graphs \( y = x^3 \) and \( y = x \) on the interval \([-1, 1]\).

4. Identify the integral that represents the area of the regions bounded by the graphs of \( y = x \) and \( y = 5x - x^3 \). Just setup the integral.

5. Use the disk method to find the volume formed by revolving the region bounded by the graphs of \( y = x^{1/2} \), \( y = 0 \), and \( x = 4 \) about the x-axis.

6. Setup the integral which would be used to find the volume generated by revolving the region bounded by the graphs of \( y = (x - 2)^{1/2} \), \( y = 0 \), and \( x = 6 \) about the y-axis. Use the disk or washer method to setup the integral.

7. Determine the integral to calculate the volume of the solid formed by revolving the region bounded by the graphs \( y = x^3 \), \( y = 1 \), and \( x = 2 \) about the line \( x = 2 \). Just setup the integral.

8. Consider the region in the first quadrant bounded by the graphs of \( y = x^2 \), \( y = 1 \), and the y-axis. Use the shell method to calculate the volume of the solid formed by revolving this region about the line \( y = 2 \).

9. Setup the integral that represents the arc length of the curve \( y = x^{1/2} \) over the interval \([0, 3]\).

10. Find the arclength of the graph of \( f(x) = (\frac{2}{3})(x - 7)^{3/2} \) on the interval \([7, 14]\).

11. Setup the integral that represents the area of a surface formed by revolving the graph of \( f(x) = 1 - x^2 \) on the interval \([0, 1]\) about the y-axis.

12. A force of 1000 pounds compresses a spring 5 inches from its natural length. Find the work done in compressing the spring 7 additional inches.