Exam 1 Review Assignment, due Tuesday, February 6th (30 points)

1. Find the volume of the solid generated by rotating the loop of the curve $y^2 = x^2(x + 3)$ about
   a.) the y-axis.
   b.) the line $x = 3$.

2. Find the length of the curve $x = \sqrt{y}$ between the points $(0, 0)$ and $(\sqrt{2}, 2)$.

3. Find the area of the surface of revolution generated by rotating the curve $y = e^x$ about the x-axis between the points $(0, 1)$ and $(\ln(10), 10)$.

4. Evaluate $\int_0^{\pi/4} \tan^{5/2}(x) \sec^6(x) \, dx$.

5. Evaluate $\int_0^{\pi/4} \sin^2(x) \cos^4(x) \, dx$.

6. Evaluate $\int_0^1 x^2 \sin(x^3) \, dx$.

7. Evaluate $\int \sin^3(2x) \cos^4(x) \, dx$.

8. Evaluate $\int \frac{x^7 - x^6 + 4x^4 - 6x^3 + 10x^2 - 11x + 10}{x^5 - x^4 - x + 1} \, dx$.

9. Evaluate $\int_1^{e^{\sqrt{2}}} \, dx$.

10. Evaluate $\int_{-1}^1 x^9 e^{x^5} \, dx$.

11. Evaluate $\int xe^{-x} \cos(x) \, dx$.

12. Evaluate $\int (x^3 + 4x^2 - 3x) \sin(-2x) \, dx$.

13. Evaluate $\int \frac{dx}{x^4 \sqrt{x^2 - 2}}$.

14. Evaluate $\int_{-2}^2 \frac{dx}{\sqrt{x^2 + 4x + 8}}$.

15. A water storage tank that has the shape of a cylinder with a diameter of 10 feet has been mounted so that its circular cross-sections are vertical. What percentage of the tank’s total capacity is being used when the depth of the water in the tank is 7 feet?