Exam 1 Review Assignment, due Tuesday, February 12th (30 points)

1. Consider the inequalities \( x - 2y^2 \geq 0 \) and \( 1 - x - |y| \geq 0 \). Sketch the region in the \( xy \)-plane defined by these inequalities and find the area of this region.

2. Let \( R \) be the region bounded by the curves \( x = y^2 + 1 \) and \( x = 9 - y^2 \). Find the volume of the solid generated by rotating \( R \) about the line \( x = 10 \).

3. Let \( T \) be the loop of the curve \( y^2 = x^2(x + 3) \). Find the volume of the solid generated by rotating \( T \) about the \( y \)-axis.

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

5. Evaluate \( \int_0^{1/2} \sqrt{1 - 4y^2} \, dy \).

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

7. Evaluate \( \int_1^4 e^{\sqrt{x}} \, dx \).

8. Evaluate \( \int \frac{8x^4 - 12x^3 - 4x^2 + 2x - 6}{x^5 - x^4 - x + 1} \, dx \).

9. Evaluate \( \int_{-2}^0 \frac{dx}{\sqrt{x^2 + 4x + 8}} \).

10. Evaluate \( \int_0^{\pi/4} \tan^3(x) \sec^{5/2}(x) \, dx \).

11. Evaluate \( \int \frac{dw}{w^4 \sqrt{w^2 - 4}} \).

12. Evaluate \( \int_1^\infty \frac{\ln(x)}{x^{5/2}} \, dx \).

13. Evaluate \( \int \left( \frac{1}{4}x^4 - 2x^3 + 11x - 7 \right) \cos(3x) \, dx \).

14. Evaluate \( \int_{-\infty}^\infty \frac{x^2}{x^6 + 6x^3 + 10} \, dx \).