HW 5: Section 4.6 and 5.1

Due: Thursday, September 19th in SQRC by 9pm

Learning Goals:

- Use u-substitution to solve integrals.
- Compute the area bounded by a given set of equations. This includes breaking up an area into multiple pieces and integrating with respect to either y or x when appropriate.

Questions:

1. Decide if you can solve the integral exactly using u-substitiion or not. If you can do so, otherwise compute an estimate for the value using Riemann sums.

$$\int_{-1}^{1} xe^{-x^2}\,dx$$

and

$$\int_{-1}^{1} e^{-x^2}\,dx$$

2. Decide if you can solve the integral exactly using u-substitiion or not. If you can do so, otherwise compute an estimate for the value using Riemann sums.

$$\int_{0}^{2} \frac{4x^2}{(x^2+1)^2}\,dx$$

and

$$\int_{0}^{2} \frac{4x^3}{(x^2+1)^2}\,dx$$

3. Find the area between the curves $y = \cos(x)$ and $y = x^2 + 2$ on the interval $0 \leq x \leq 2$.

4. Sketch and find the area of the region bounded by $x = y^2 - 1$ and $x = \frac{1}{2}y^2$.

5. Sketch the the region bounded by the curves $x = 2y$ and $x = y^2 - 2$. Compute the area in two ways: integrating with respect to x and integrating with respect to y.