Practice Midterm 1

Compute the following integrals

1. $\int \frac{e^x}{e^{2x}+2e^x+1}\,dx$

2. $\int_{28}^{65} \frac{1}{\sqrt[3]{x^2-2x+1}}\,dx$

3. $\int x^7(x^4-1)^{2012}\,dx$

4. $\int xe^{x^2}\sec^2(e^{x^2}) + \tan(x)\,dx$

Let R be the region bounded by $y = x^3$, $y = 0$, $x = 1$.

1. Set up the integral to find the volume rotated about $y = 1$ using discs/washers.

2. Find the volume rotated about $y = 1$ using shells.

Find the area of the triangle with the given vertices

$$(0, 5), \quad (2, -2) \quad (5, 1)$$

1. With respect to y

2. With respect to x

Find

$$\lim_{x\to0}\frac{\int_{x^2}^{x^3}\cos(t^2)\,dt}{x}.$$

Find an expression for the area under the graph of $f(x)$ as a limit, where $f(x) = x\cos(x)$ and $0 \le x \le \pi/2$

Use Midpoint Rule with $n = 4$ to approximate the area of the region bounded above by $y = \sqrt{x^2 + 1}$ and bounded below by $y = 1 - x^2$ for $0 \le x \le 1$.

A tomato is thrown vertically upward from ground level toward the ceiling of a tall barn. The ceiling height is 20 meters. With what velocity must the tomato be thrown so that it *just reaches* the ceiling? *Assume acceleration due to gravity is* $10m/s^2$.