MAC2312: Calculus 2 - Section 3

Test 2 Review June 24, 2015

1. Determine whether $\displaystyle\int_1^\infty \frac{1}{x^2+x}\,dx$ is convergent or divergent.
2. Set up an integral for the length of the curve $y = \frac{1}{2}x^2 - \frac{1}{2}\ln x$ for $1 \le x \le 2$.
3. Set up an integral for the area of the surface obtained by rotating the curve $x = 1 + 2y^2$ for $1 \le y \le 2$ about the x-axis.
4. Find the center of mass (centroid) of the region bounded by the curves $y = e^x$ and $y = 0$ for $0 \le x \le 1$.
5. Verify that $f(x) = \dfrac{1}{\pi} \cdot \dfrac{1}{1+x^2}$ is a probability density function with probability space $(-\infty, \infty)$ and find the mean.
6. Verify that $y = \frac{1}{2}x\cos x$ is a solution to $y'' + y = -\sin x$.
7. Find the solution of the differential equation $y' = \dfrac{\ln x}{xy}$ that satisfies the initial conditions $y(1) = 2$. Could you approximate this solution using Euler's Method?