

Math 125: Practice Midterm 2

****Disclaimer: This is a little harder than the standard midterm and the questions are written with me having no knowledge regarding the actual test.*

1. Evaluate the following integrals:

(a) $\int (\sin \theta \cos \theta) e^{(\sin^2 \frac{\theta}{2})} d\theta$

(b) $\int_{\ln \frac{1}{2}}^{\ln \frac{1}{\sqrt{2}}} \frac{e^x}{1 - e^{2x}} dx$

(c) $\int \sqrt{\frac{x^2 + 9}{x^4}} dx$

2. You are helping Reggie get out of a 50 foot well by lifting him with a rope which weighs .2 lb/ft. Since Reggie is wet, he is dripping water and steadily becomes .05 pounds lighter with every foot you lift him. If Reggie initially weighs 200 pounds, find the total work done to get him out of the well.

3. Use Simpson's method with $n = 4$ on $2 < x < 6$ to approximate the arc length of the curve $f(x) = x^2 + e^x$. (Note: arc length $= \int_a^b \sqrt{1 + f'(x)} dx$)

4. Prove that $\int_{-\infty}^{\infty} \frac{dx}{1+x^2} = \pi$.

5. Solve these puppies:

(a) $\int u^2 \cos u \, du$

(b) $\int 2x\sqrt{x^4 - 1} \, dx$

(c) $\int \frac{x^3 + 3x + 2}{x^2 - 4x + 3} \, dx$