

Math 106C
Exam 2
Winter 2015
March 13, 2015
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Please show your work.

1. Evaluate the following:

a) $\int \frac{1}{x(x^2-1)} dx$

b) $\int (1 + \sin^2(x))\cos^3(x)dx$

c) $\int x \ln(x) dx$

2. Evaluate $\int_2^3 \frac{x}{x-1} dx$

3. Determine if the following integrals converge or diverge. If the integral converges, evaluate the integral.

a) $\int_1^{\infty} \frac{1}{x^{12}} dx$

b) $\int_0^{\infty} e^{-5x} dx$

c) $\int_0^1 \frac{1}{x^{8/3}} dx$

4. Use comparisons to show whether each of the following converges or diverges.

a) $\int_1^{\infty} \frac{e^{1/x}}{x^2} dx$

b) $\int_1^{\infty} \frac{1}{(1+x^2)^3} dx$

5. a) Find the second-order Taylor polynomial for $f(x) = \sqrt{x}$ based at $x_0 = 4$.

b) Use your results from part (a) to estimate $\sqrt{6}$.

- c) Taylor's Theorem says that $|f(x) - P_n(x)| \leq \frac{K_{n+1}}{(n+1)!} |x - x_0|^{n+1}$ for all values of x in an interval I containing x_0 . Using this result, what is the largest possible error that could have occurred in your estimate of $\sqrt{6}$?

6. Evaluate: $\int \tan^3(\theta) \sec(\theta) d\theta$

7. Evaluate: $\int \frac{\sqrt{x^2-1}}{x} dx$