

Math 106 A/B
Calculus 2
Fall 2015
Exam 2
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Please show your work.

1. Evaluate the following:

a) $\int \tan^5(x)\sec^2(x)dx$

b) $\int x\sin(3x)dx$

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

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

a) $\int_1^{\infty} \frac{1}{x^4} dx$

b) $\int_2^{\infty} \frac{x}{(x^2+1)^2} dx$

c) $\int_1^2 \frac{1}{\sqrt{x-1}} dx$

3. Use comparison to show whether the following converges or diverges.

$$\int_4^{\infty} \frac{1}{x^2 \ln(x)} dx$$

4. a) Find the 4th-order Taylor Polynomial for $f(x) = \ln(x+1)$ based on $x_0 = 0$.

b) Use your results from part (a) to estimate $\ln(1.1) = \ln(0.1 + 1)$.

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 containing x_0 . Using this result, what is the largest possible error that could have occurred in your estimate of $\ln(1.1)$.

5. Does the following improper integral converge or diverge? If it converges, evaluate the integral.

$$\int_0^{\pi/2} \tan(\theta) d\theta$$

6. Does the following improper integral converge or diverge? If it converges, evaluate the integral.

$$\int_1^{\infty} \frac{e^x}{2x+1} dx$$

7. Evaluate: $\int \sqrt{4-x^2} dx$