

Math 106D
Calculus 2
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Exam 2
March 13, 2009

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

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

3. Calculate the integral: $\int 2xe^{-x} dx$

4. Does $\int_1^{\infty} \frac{1}{x - \cos(x)} dx$ converge? Justify your answer.

5. Evaluate: $\int_0^1 \frac{dx}{\sqrt[3]{x}}$

6. Find a value for "a" that makes the improper integral $\int_a^\infty xe^{-x^2} dx$ less than 10^{-5} .

7. Find the integral: $\int \frac{x^2 - 1}{x^3 + x} dx$

8. Give the fourth order Maclaurin polynomial ($x_0 = 0$) for $f(x) = \ln(1+x)$

9. The third order Maclaurin polynomial ($x_0 = 0$) for $f(x) = \sin(x)$ is

$$P_3(x) = x - \frac{x^3}{3!}.$$

a) Calculate $|f^{(4)}(x)|$.

b) If $I = [0, 0.1]$, find an upper bound K_4 for $|f^{(4)}(x)|$ on I .

c) Taylor's Theorem says that $|f(x) - P_3(x)| \leq \frac{K_4}{4!} |x - x_0|^4$ for all values of x in an interval I containing x_0 . Calculate the maximum approximate error for values of x in I , i.e. the maximum value of $\frac{K_4}{4!} |x - x_0|^4$ on I .

10. Evaluate: $\int \sec^5(x) \tan^3(x) dx$