

Exam 1

Math 231

February 16, 2007

Name:

Directions

1. Be sure to show all work to receive full credit.
2. No calculators, books, notes or cell phones are allowed during the exam.
3. You may find the following facts useful

(a) $\int \sec x \, dx = \ln |\sec x + \tan x| + c.$

(b) $\lim_{x \rightarrow \infty} \frac{\ln x}{x} = 0.$

1. (a) Write the general formula for integration by parts. (3 pts)

(b) Compute $\int \sin(2x)e^{2x} dx$. (8 pts)

2. (a) Draw the reference triangle for the substitution $4x = 5 \sin \theta$. (3 pts)

(b) Evaluate $\int \frac{1}{x\sqrt{(\ln x)^2 - 9}} dx$. (8 pts)

3. (a) Evaluate $\int \sin^4(x) dx$. (8 pts)

(b) Evaluate $\int \tan^3 x \sec x dx$. (8 pts)

4. (a) Find the general form of the partial fraction decomposition of $\frac{x^2 - 2}{(x^2 + 4x + 4)(x^2 + 1)}$ (do not find the actual values of A , B , etc.). (3pts)

- (b) Find the partial fraction decomposition of $\frac{4x^2 + 3x + 2}{x^3 + 2x^2 + x}$. (6 pts)

(c) Evaluate $\int \frac{4x^2 + 3x + 2}{x^3 + 2x^2 + x} dx$. (4 pts)

5. Evaluate $\int \frac{1}{\sqrt{-x^2 - 6x - 5}} dx$. Please work out any trigonometric substitutions that may be necessary. (10 pts)

6. Determine if $\int_{-8}^8 x^{-2/3} dx$ converges or diverges and evaluate the integral if it converges. (10 pts)

7. Determine the convergence of $\int_1^{\infty} x^{-2} \ln x \, dx$ and evaluate the integral if it converges. (9 pts)