

First Midterm Exam
Math 102 – Section 003 – Chesebro
Spring 2008

Instructions: This is a 50 minute exam. You may not consult any notes or books during the exam, and no calculators are allowed. Show all of your work on each problem. Attach extra paper if you need more space.

Name:

Honor Pledge: On my honor, I have neither received nor given any unauthorized aid on this exam.

Signature:

Problem	Score
1	
2	
3	
4	
5	
6	
Total	

1. **Problem 1 (10 pts)**

Evaluate the integral $\int \frac{x}{x^4+1} dx$.

2. **Problem 2 (10 pts)**

Evaluate the integral $\int x(\ln x)^2 dx$.

3. Problem 3 (10 pts)

Evaluate the integral $\int \sin^{10} \theta \cos^3 \theta d\theta$.

4. Problem 4 (10 points)

Evaluate the integral $\int \frac{1}{x^3 - x^2} dx$.

5. **Problem 5 (10 points)**

Evaluate the integral $\int \frac{dx}{x^2\sqrt{x^2-9}}$. Express your final answer without the use of trigonometric functions.

6. **Problem 6 (10 points)**

Determine whether or not the improper integral converges. If it converges, find its value. If it diverges to $\pm\infty$, specify which one.

$$\int_0^1 \frac{1}{x(\ln x)^2} dx$$

Half and double angle identities

$$\sin^2 \theta = \frac{1}{2}(1 - \cos 2\theta)$$

$$\cos^2 \theta = \frac{1}{2}(1 + \cos 2\theta)$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

Integrals of basic trigonometric functions

$$\int \tan x \, dx = -\ln |\cos x| + C = \ln |\sec x| + C$$

$$\int \cot x \, dx = \ln |\sin x| + C = -\ln |\csc x| + C$$

$$\int \sec x \, dx = \ln |\sec x + \tan x| + C$$

$$\int \csc x \, dx = -\ln |\csc x + \cot x| + C$$