

MAT126 Fall 2009

Practice Midterm II

The actual midterm will consist of six problems

Problem 1 If the function $g(x)$ is given by

$$g(x) = \int_{2x}^{x^2} t \ln t dt,$$

compute the derivative $g'(x)$

- a) by using the Fundamental Theorem of Calculus to differentiate the integral
- b) by using the Evaluation Theorem to first evaluate $g(x)$ explicitly, and then differentiating.

Problem 2 Evaluate the following definite integral:

1.

$$\int_0^2 x^2 \sqrt{4-x^2} dx$$

2.

$$\int_1^{e^\pi} \frac{\cos(\ln x) \sin^2(\ln x)}{x} dx$$

3.

$$\int_{1/\pi}^{2/\pi} \frac{\sin(1/x)}{x^2} dx$$

Problem 3 Evaluate the following indefinite integral using integration by parts:

1.

$$\int \arcsin(x) dx$$

2.

$$\int \sqrt{x} \ln^2(x) dx$$

Problem 4 Evaluate

$$\lim_{n \rightarrow \infty} \int_0^{2\pi} x \sin(nx) dx$$

Problem 5 Decompose a rational function into partial fractions

$$\frac{x^3 - 6x}{x^2 + 4x + 4}$$

Problem 6 Evaluate the integral

$$\int_0^1 \frac{x+1}{x^2+9} dx$$

Problem 7 Can the midpoint approximation to the integral

$$\int_1^2 \frac{1}{x^2}$$

with $n = 100$ be equal to

- $\frac{1}{7}$.
- $\frac{1}{5}$

To get a full credit you need to justify your answer