

MA 126 - 7B CALCULUS II

October 05, 2011

Name (Print last name first):

Student Signature:

TEST II

Closed book - No calculators!

PART I

Part I consists of 6 questions. Clearly write your answer (only) in the space provided after each question. You do not need to show your work for this part of the test. No partial credit is awarded for this part of the test!

Each question is worth 5 points.

Question 1

If $\int_{-1}^5 f(x) dx = 10$ and $\int_1^5 f(x) dx = -12$, find the numerical value of $\int_{-1}^1 f(x) dx$.

Answer:

Question 2

Find the derivative of the function $g(x) = \int_{-2}^x t^2 \sin(3t) dt$.

Answer:

Question 3

Evaluate the definite integral

$$\int_{e^{34}}^{e^{35}} \frac{2}{x} dx$$

(Your answer must be a real number!)

Answer:

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

Answer:

Question 5Evaluate the indefinite integral $\int x \cos(x) dx$.

Answer:

Question 6If $\mathbf{r}(t) = \langle t^2, \cos(t), \sin(t) \rangle$, find the tangent vector $\mathbf{r}'(t)$ when $t = 0$.

Answer:

PART II

Each problem is worth 14 points.

Part II consists of 5 problems. You must show your work on this part of the test to get full credit. Displaying only the final answer (even if correct) without the relevant steps will not get full credit.

Problem 1

Consider the function $f(x) = (x - 3)^2$ on the interval $[2, 5]$.

- (a) Find the average value, f_{ave} , of the function f on the given interval. (Your answer must be a real number!)

- (b) Find the numerical value(s) of c such that $f(c) = f_{\text{ave}}$.

Problem 2

The velocity function (in meters per second) of an object moving along a line is given by

$$v(t) = t - 2, \quad 0 \leq t \leq 4.$$

(a) Find the displacement (in meters) of the object during the time interval $0 \leq t \leq 4$.

(b) Find the distance (in meters) traveled by the object during the time interval $0 \leq t \leq 4$.

Problem 3

This problem has two separate questions (a) and (b). Answer each question.

(a) Evaluate the definite integrals

$$\int_{-6}^0 \sqrt{36 - x^2} dx \quad \text{and} \quad \int_{-2}^2 |x| dx$$

by interpreting them in terms of areas.

(b) Evaluate the definite integral

$$\int_1^4 \frac{3x - 4}{\sqrt{x}} dx.$$

(Your answer must be a real number!)

Problem 4

This problem has two separate questions (a) and (b). Answer each question.

(a) Evaluate the definite integral $\int_{e^{16}}^{e^{49}} \frac{1}{x\sqrt{\ln(x)}} dx$. (Your answer must be a real number!)

(b) Evaluate the indefinite integral $\int \sin^4(x) \cos^3(x) dx$.

Problem 5

This problem has two separate questions (a) and (b). Answer each question.

(a) Evaluate the indefinite integral $\int x^2 e^x dx$.

(b) Suppose that $f(0) = 2$, $f(1) = 4$, $f'(0) = -1$, $f'(1) = 1$, and that $f''(x)$ is continuous. Find the numerical value of the definite integral $\int_0^1 x f''(x) dx$.

SCRATCH PAPER

(Scratch paper will not be graded!)

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