MA 126-7B, CALCULUS II
October 11, 2010

Name (Print last name first): .....

Student Signature: .....

TEST II

Closed book test – No calculators are permitted!

PART I

Each question is worth 5 points.

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

Question 1

If $\int_0^3 f(x)\,dx = 4$ and $\int_0^3 g(x)\,dx = -2$, find the numerical value of $\int_0^3 (f(x) - 5g(x))\,dx$.

Answer: .....

Question 2

Find the derivative of the function $g(x) = \int_2^x \ln(\sqrt{t})\,dt$.

Answer: .....

Question 3

Evaluate the definite integral

$$\int_1^e \frac{5}{x}\,dx$$

(Your answer must be a real number!)

Answer: .....

Question 4

Evaluate the definite integral $\int_0^{\sqrt{\pi}} 2x\sin\left(x^2\right)\,dx$. (Your answer must be a real number!)

Answer: .....

Question 5

Evaluate the indefinite integral $\int xe^x\,dx$.

Answer: .....

Question 6

If $\mathbf{r}(t) =< t^2, \cos(t), \sin(t) >$, 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 $f(x) = \sqrt{x}$ on the interval $[0, 4]$.

(a) Find the average value, f_{ave}, of the function f on the given interval.

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

Problem 2

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

$$v(t) = t^2 + t - 2, \qquad 0 \leq t \leq 2.$$

(a) Find the displacement (in miles) of the object during the given time interval $0 \leq t \leq 2$.

(b) Find the distance (in miles) traveled by the object during the given time interval $0 \leq t \leq 2$.

(Simplify and express your answer as a fraction if need be!)

Problem 3

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

(a) Evaluate the definite integrals

$$\int_{-3}^{3} \sqrt{9-x^2}\, dx \quad \text{and} \quad \int_{-1}^{2} |x|\, dx$$

by interpreting them in terms of areas.

(b) Evaluate the indefinite integral

$$\int \frac{1}{x\sqrt{\ln(x)}}\, dx.$$

Problem 4

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

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

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

Problem 5

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

(a) Evaluate the indefinite integral $\displaystyle\int \frac{x^3+\sqrt{x}}{x^2}\,dx.$

(b) Evaluate the definite integral $\displaystyle\int_0^1 \frac{1}{x^2+4x+3}\,dx.$

(Simplify your result by expressing your final answer as a single logarithm!)

SCRATCH PAPER

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