MA 114 — Calculus II Fall 2013
Exam 1 5 February 2013

Name: _____

Section: _____

Last 4 digits of student ID #: _____

This exam has ten multiple choice questions (five points each) and five free response questions (ten points each). Additional blank sheets are available if necessary for scratch work. No books or notes may be used. Turn off your cell phones and do not wear ear-plugs during the exam. You may use a calculator, but not one which has symbolic manipulation capabilities.

On the multiple choice problems:

1. You must give your *final answers* in the *multiple choice answer box* on the front page of your exam.
2. Carefully check your answers. No credit will be given for answers other than those indicated on the *multiple choice answer box*.

On the free response problems:

1. Clearly indicate your answer and the reasoning used to arrive at that answer *(unsupported answers may not receive credit)*,
2. Give exact answers, rather than decimal approximations to the answer (unless otherwise stated).

Each free response question is followed by space to write your answer. Please write your solutions neatly in the space below the question. You are not expected to write your solution next to the statement of the question.

Multiple Choice Answers

Question					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E

Exam Scores

Question	Score	Total
MC		50
11		10
12		10
13		10
14		10
15		10
Total		100

Record the correct answer to the following problem on the front page of this exam.

(1) Evaluate the integral $\int x\sin(x)dx$.

A) $x\cos(x) + \sin(x)$+C

B) $\frac{-x^2}{2}\cos(x)$ +C

C) $\sin(x) + x\cos(x)$ +C

D) $\frac{-\sin^2(x)}{2}$ +C

E) $-x\cos(x) + \sin(x)$ + c

(2) If a force F = $F(x)$ in Newtons is given by the graph shown, find the work done by the force in Joules in moving a particle from $x = 0$ to $x = 2$, where x is in meters.

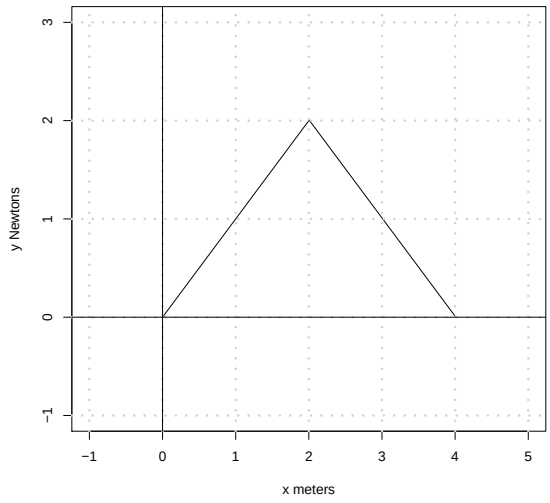
A) 2

B) 3

C) 4

D) 5

E) 6



Record the correct answer to the following problem on the front page of this exam.

(3) Given a solid whose base is a circle in the $x-y$ plane centered at the origin with radius 4, and whose cross sections taken perpendicular to the x-axis are squares. Find the area of a cross section taken at $x = x_0$.

A) $4(4 - x_0^2)$

B) $2\pi(4 - x_0^2)$

C) 16π

D) $2(x_0^2 - 4)$

E) $4\sqrt{4 - x_0^2}$

(4) To evaluate $\int x^3 e^{x^2} dx$ by parts, what is the correct substitution?

A) $u(x) = x^2, v'(x) = xe^{x^2}$

B) $u(x) = x^3, v'(x) = e^{x^2}$

C) $u(x) = x, v'(x) = e^{x^2}$

D) $u(x) = e^{x^2}, v'(x) = x^2$

E) $u(x) = 1, v'(x) = x^3 e^x$

(5) To evaluate the integral $\int \frac{x^2}{(x^2-4)^{3/2}} dx$ one would use which substitution?

A) $x = s\tan(x)$

B) $x = \sin(x)$

C) $x = 2\sec(x)$

D) $u = x^2 - 1$

E) $x = 4\sin(x)$

Record the correct answer to the following problem on the front page of this exam.

(6) Evaluate the integral $\int \sin(2x)\cos(2x)dx$

A) $\frac{1}{4}\sin^2(2x)$+C

B) $\frac{1}{2}\cos^2(2x)$+C

C) $\tan(2x)$+C

D) $\sec(2x)\tan(2x)$+C

E) $\cos(2x)\sin(2x)$+C

(7) Evaluate the integral

$$\int \sec^3(x)\tan^3(x)dx$$

(8) Evaluate the integral

$$\int \frac{x^2}{\sqrt{9-x^2}} dx$$

(9) Find the average of the function $f(x) = x^2 \sin(x)$ over the interval $0 \leq x \leq \pi$.

(10) Find the volume of the solid that is generated by revolving the area bounded by the curves $y = x^2$ and $y = x^3$ around the y axis.

(11) Find the volume of the solid obtained by revolving the curve $y = (x^2 - 1)^{2/3}$, for $0 \leq x \leq 1$, about the y-axis. (hint: Use the method of shells)

(12) Find the work done in emptying a trough by pumping the water from the top if the trough is 2 meters long, 0.5 meters wide at the top, and 0.25 meters deep and has a cross section that is an isosceles triangle. The density of water is 1000 kg/m^3.

USEFUL FORMULAS AND CONSTANTS

Trigonometric Identities

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

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

Acceleration due to gravity

$g = 9.8 m/sec^2$, $g = 32 ft/sec^2$.