MATH 162 – FALL 2007 – FIRST EXAM
SEPTEMBER 12, 2007

STUDENT NAME————————————————————

STUDENT ID————————————————————

INSTRUCTOR ————————————————————

RECITATION INSTRUCTOR————————————————

RECITATION TIME————————————————————

INSTRUCTIONS

1. Verify that you have **7 pages.**
2. Fill in the blank spaces above.
3. Use a number 2 pencil to write on your **mark-sense sheet.**
4. **On your mark sense sheet**, write your name, your student ID number, the division and section numbers of your recitation, and fill the corresponding circles.
5. Mark the letter of your response for each question on the **mark-sense sheet.**
6. There are 12 questions. **The first two questions are worth 5 points each. The other 10 are worth 9 points each.**
7. Show as much as possible of your work. Although this exam will be machine graded, in certain situations it may be necessary that we look at your exam.
8. **No books, notes or calculators may be used.**

Answers

1A 2D 3B 4D 5C 6C
7B 8C 9E 10A 11D 12E

1) (5 points) If $\vec{p} = \langle 1, 3, 4 \rangle$ and $\vec{q} = \langle 3, 1, 1 \rangle$, then $|\vec{p} - \vec{q}|$ is equal to

A) $\sqrt{17}$

B) 4

C) $\sqrt{26} - \sqrt{11}$

D) 8

E) $3\sqrt{2}$

2) (5 points) Which is true?

I) The dot product of two vectors is a real number

II) The cross product of two vectors is a real number

III) If $\vec{A}$ and $\vec{B}$ are orthogonal, then $\vec{A} \cdot \vec{B} = 0$.

A) Only I

B) Only II

C) Only III

D) Only I and III

E) Only II and III

3) (9 points) Find the volume of a parallelepiped if it has one vertex at the origin, and the neighboring vertices at $A(1,0,2)$, $B(2,1,1)$ and $C(1,1,1)$.

A) 1

B) 2

C) 3

D) -1

E) 6

4) (9 points) The area of the planar triangle with vertices $(1,1)$, $(3,2)$ and $(1,-1)$ is

A) 6

B) 4

C) 3

D) 2

E) 1

5)(9 points) Sal, the mule, hauls a barge up the Erie Canal. A rope is attached to the barge, at an angle of 30 degrees to the direction of the canal, and Sal pulls the rope with a force of magnitude F as she trots along. Supposing they cover distance D, how much work is done by Sal?

A) FD

B) $\frac{FD}{2}$

C) $\frac{FD\sqrt{3}}{2}$

D) $\frac{FD}{\sqrt{3}}$

E) $\frac{2FD}{\sqrt{3}}$

6)(9 points) The area of the region between the curves $y = \frac{x}{2} + 4$, and $x = y^2 - 4y$ is given by

A) $\int_{-4}^{0} \left(y^2 - 4y - \frac{x}{2} - 4\right)\ dx$

B) $\int_{-4}^{0} \left(\frac{x}{2} + 2 - \sqrt{4+x}\right)\ dx$

C) $\int_{2}^{4} (6y - 8 - y^2)\ dy$

D) $\int_{2}^{4} (7y - 8 - y^2)\ dy$

E) $\int_{2}^{4} \left|y^2 - \frac{9y}{2} - 4\right|\ dy$

7)(9 points) The integral

$$\int_0^1 (\sqrt{x} - x)\, dx$$

represents the area of the region bounded by the curves

A) $y = x^2$ and $y = x$

B) $x = y^2$ and $x = y$

C) $x = y^2 - 2$ and $x = y$

D) $y = 6x + 2$ and $y = x^2$

E) $y = x^2$ and $y = 0$.

8)(9 points) Take the region bounded by the curves $y = \sqrt{x}$, and $y = x$ and rotate it about the x-axis. The volume of the solid generated is equal to

A) $\frac{\pi}{2}$

B) $\frac{2\pi}{3}$

C) $\frac{\pi}{6}$

D) $\frac{3\pi}{2}$

E) 2π

9) (9 points) Take the region bounded by $y = x^2$ and $y = x$ and rotate it about the line $x = 1$. Using the method of cylindrical shells, the volume of the solid generated is given by the integral

A) $2\pi \int_0^1 (x^3 - 4x^2 + 3x)\, dx$

B) $2\pi \int_0^1 (x^3 + 2x^2 + 3x)\, dx$

C) $2\pi \int_0^1 (x^3 - 2x^2 + 3x)\, dx$

D) $2\pi \int_0^1 (2x^3 + 2x^2 + 3x)\, dx$

E) $2\pi \int_0^1 (x^3 - 2x^2 + x)\, dx$

10) (9 points) A cubic tank whose sides are $1\,\mathrm{m}$ long sits on the ground and it is filled with a liquid of density $100\ \mathrm{Kg/m^3}$. If we take the acceleration of gravity $g = 10\,\mathrm{m/s^2}$, the necessary work to empty the tank by pumping the liquid through its top is, in Joules, equal to

A) 500

B) 400

C) 800

D) 200

E) 300