

### COURSE DETAILS:

ORIENTATION MATHEMATICS II		MATH 002	MAJOR EXAM II	A
Semester:	Fall Semester --Term 191			
Date:	Monday November 25, 2019			
Time Allowed:	90 minutes			

### STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	
Instructor's Name:	

### INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

### GRADING:

	Page 1	Page 2	Page 3	Page 4	Page 5	Total	Total
Questions							
Marks	8	8	19	13	12	60	15

**Q.1A (16 points) Choose the correct answer**

1) The following system of linear equations  $\begin{cases} x + y = 8 \\ -x - y = 10 \end{cases}$  is:

- A) Consistent with infinitely many solutions
- B) Inconsistent with one solution
- C) Inconsistent with no solution
- D) Consistent with exactly one solutions

2) If  $\cos^{-1}(\cos x) = x$ , then  $x$  **belongs to**:

- A)  $[-1,1]$
- B)  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
- C)  $[0,\pi]$
- D)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

3) The solution set of the following system  $\begin{cases} x + y - z = 1 \\ y + 2z = 3 \\ z = 4 \end{cases}$  is:

- A)  $\{(4,-5,10)\}$
- B)  $\{(10,-5,4)\}$
- C)  $\{(-6,11,4)\}$
- D)  $\{(-8,-5,4)\}$

4) If  $A$  is a  $2 \times 4$  matrix and  $B$  is a  $4 \times 3$  matrix, what should matrix  $C$  be so that the operation  $A \cdot B + 3C$  is **defined**?

- A)  $C$  is  $4 \times 4$
- B)  $C$  is  $2 \times 3$
- C)  $C$  is  $4 \times 6$
- D)  $C$  is  $3 \times 2$

*You must write the correct answer to each question in the box below*

Question	1	2	3	4
Answer				

5A)  $\cos(70^\circ)\cos(10^\circ) + \sin(70^\circ)\sin(10^\circ) =$

A)  $\cos(70^\circ - 10^\circ)$

B)  $\cos(70^\circ + 10^\circ)$

C)  $\sin(70^\circ - 10^\circ)$

D)  $\sin(70^\circ + 10^\circ)$

6) Find  $\sin^{-1}(-0.981)$  in radians rounded to two decimal places.

A)  $-78.81$

B)  $-1.20$

C)  $-1.38$

D)  $58.41$

7) The solution set for  $2\sin(x) - 1 = 0$ ,  $0 \leq x < 2\pi$  is:

A)  $\frac{\pi}{3}, \frac{\pi}{6}$

B)  $\frac{\pi}{6}, \frac{7\pi}{6}$

C)  $\frac{\pi}{6}, \frac{5\pi}{6}$

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

8) If  $A = \begin{bmatrix} 4 & 2 & -5 \\ 3 & 1 & -2 \\ 6 & -10 & 9 \end{bmatrix}$ , then  $a_{23} =$

A)  $-10$

B)  $2$

C)  $1$

D)  $-2$

*You must write the correct answer to each question in the box below*

Question	5	6	7	8
Answer				

**Q.2A (5 points):** Find the value of  $\tan\left(\cos^{-1}\left(-\frac{4}{7}\right)\right)$ , without using a calculator. Show all your steps.

**Q.3 (6 points):** given that  $\tan \alpha = -\frac{2}{5}$  where  $\alpha$  is in  $Q2$ , and  $\sec \beta = \frac{8}{3}$ , where  $\beta$  is in  $Q4$

Find  $\sin(\alpha - \beta)$

**Q.4 (8 points):** Solve the following equations on the interval  $[0, 360^\circ)$

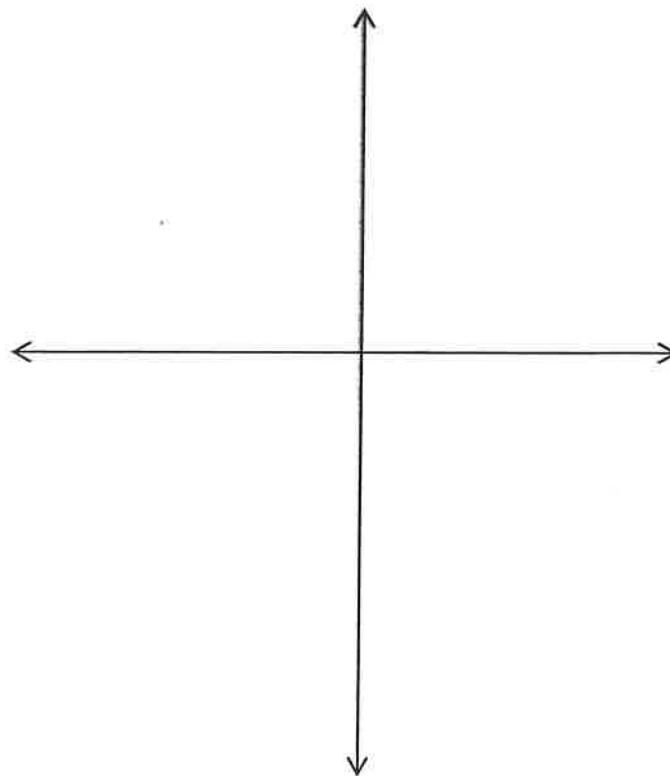
a)  $\tan(3x) = \sqrt{3}$

b)  $4\sin^2(x) - 1 = 0$

**Q.5A (5 points):** Given that  $A = \begin{bmatrix} -2 & 1 & 0 \\ 3 & -1 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 0 \\ -1 & 2 \\ 6 & 1 \end{bmatrix}$ , and  $C = \begin{bmatrix} -2 & 5 \\ 7 & 4 \end{bmatrix}$

Find  $AB - 3C$

**Q.6 (8 points):** Graph the solution set of the following system of inequalities. 
$$\begin{cases} y \leq 4 - x^2 \\ x - y \leq 2 \\ y + 2x \geq 0 \end{cases}$$



**Q.7A (4 points):** Solve the following system using substitution.

$$\begin{cases} 4x - 3y = 14 \\ x - 2y = 1 \end{cases}$$

**Q.8 (8 points):** Solve the following system using **Gaussian Elimination with back substitution** OR

using **Gauss – Jordan**.

$$\begin{cases} x + 2y - z = 6 \\ 2x - y + 3z = -13 \\ 3x - 2y + 3z = -16 \end{cases}$$



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**Q.1B (16 points) Choose the correct answer**

1) If  $A = \begin{bmatrix} 4 & 2 & -5 \\ 3 & 1 & -2 \\ 6 & -10 & 9 \end{bmatrix}$ , then  $a_{23} =$

- A) 2
- B) -2
- C) 1
- D) -10

2) The solution set for  $2 \sin(x) - 1 = 0$ ,  $0 \leq x < 2\pi$  is:

- A)  $\frac{\pi}{6}, \frac{5\pi}{6}$
- B)  $\frac{\pi}{6}, \frac{7\pi}{6}$
- C)  $\frac{\pi}{3}, \frac{\pi}{6}$
- D)  $\frac{\pi}{3}, \frac{2\pi}{3}$

3)  $\cos(70^\circ)\cos(10^\circ) + \sin(70^\circ)\sin(10^\circ) =$

- A)  $\cos(70^\circ - 10^\circ)$
- B)  $\sin(70^\circ + 10^\circ)$
- C)  $\cos(70^\circ + 10^\circ)$
- D)  $\sin(70^\circ - 10^\circ)$

4) Find  $\sin^{-1}(-0.981)$  in radians rounded to two decimal places.

- A) -1.38
- B) 58.41
- C) -1.20
- D) -78.81

*You must write the correct answer to each question in the box below*

Question	1	2	3	4
Answer				



5B) The solution set of the following system  $\begin{cases} x + y - z = 1 \\ y + 2z = 3 \\ z = 4 \end{cases}$  is:

A)  $\{(-6, 11, 4)\}$

B)  $\{(-8, -5, 4)\}$

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D)  $\{(4, -5, 10)\}$

6) If  $A$  is a  $2 \times 4$  matrix and  $B$  is a  $4 \times 3$  matrix, what should matrix  $C$  be so that the operation  $A \cdot B + 3C$  is **defined**?

A)  $C$  is  $4 \times 6$

B)  $C$  is  $4 \times 4$

C)  $C$  is  $3 \times 2$

D)  $C$  is  $2 \times 3$

7) The following system of linear equations  $\begin{cases} x + y = 8 \\ -x - y = 10 \end{cases}$  is:

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D)  $[-1, 1]$

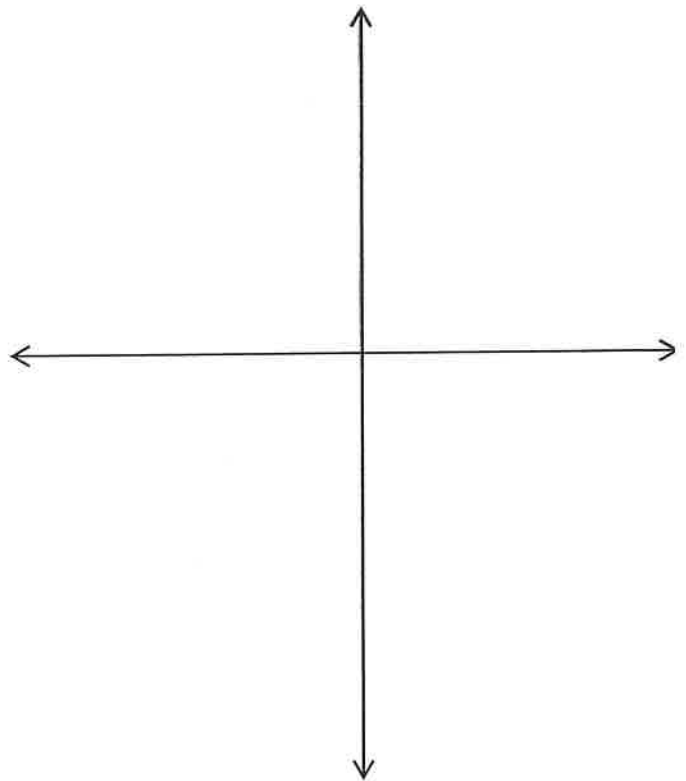
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Question	5	6	7	8
Answer				

**Q.2B (5 points):** Given that  $A = \begin{bmatrix} -2 & 1 & 0 \\ 3 & -1 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 0 \\ -1 & 2 \\ 6 & 1 \end{bmatrix}$ , and  $C = \begin{bmatrix} -2 & 5 \\ 7 & 4 \end{bmatrix}$

**Find**  $AB - 3C$

**Q.3 (8 points):** Graph the solution set of the following system of inequalities. 
$$\begin{cases} y \leq 4 - x^2 \\ x - y \leq 2 \\ y + 2x \geq 0 \end{cases}$$



**Q.4B (4 points):** Solve the following system using substitution.

$$\begin{cases} 4x - 3y = 14 \\ x - 2y = 1 \end{cases}$$

**Q.5 (8 points):** Solve the following system using **Gaussian Elimination with back substitution** OR

**using Gauss – Jordan.**

$$\begin{cases} x + 2y - z = 6 \\ 2x - y + 3z = -13 \\ 3x - 2y + 3z = -16 \end{cases}$$

**Q.6B (5 points):** Find the value of  $\tan\left(\cos^{-1}\left(-\frac{4}{7}\right)\right)$ , without using a calculator. Show all your steps.

**Q.7 (6 points):** given that  $\tan \alpha = -\frac{2}{5}$  where  $\alpha$  is in  $Q2$ , and  $\sec \beta = \frac{8}{3}$ , where  $\beta$  is in  $Q4$

**Find**  $\sin(\alpha - \beta)$

**Q.8 (8 points):** Solve the following equations on the interval  $[0, 360^\circ)$

a)  $\tan(3x) = \sqrt{3}$

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