Prince Sultan University

Deanship of Educational Services

Department of Mathematics and General Sciences

COURSE DETAILS:

ORIENTATION MATHEMATICS II	MATH 002	MAJOR EXAM II A
Semester:	Spring Semester --Term 182	
Date:	Sunday March 31, 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	**10**	**10**	**19**	**21**	**20**	**80**	**20**

Q.1A (20 points) **Choose the correct answer**

1. If A is a 4×4 matrix, B is a 3×4 matrix, and C is a 4×3 matrix. Which of the following operations is **defined**?

   A) $BC-A$

   B) $BA+C$

   C) $CB+A$

   D) $AC+B$

2. If $\sin\left(\sin^{-1}(x)\right)=x$, then x **belongs to:**

   A) $[0,\pi]$

   B) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

   C) $[-1,1]$

   D) $\mathbb{R}$

3. $\cos60^\circ\cos15^\circ-\sin60^\circ\sin15^\circ=$

   A) $\cos45^\circ$

   B) $\cos75^\circ$

   C) $\sin75^\circ$

   D) $\sin45^\circ$

4. Given that $(8,5)$ is a solution of the system: $\begin{cases}ax-4y=20\\2x+by=1\end{cases}$. Find the values of a and b.

   A) $a=4$, $b=-5$

   B) $a=-3$, $b=5$

   C) $a=2$, $b=-4$

   D) $a=5$, $b=-3$

5. Find the value of b that makes the system: $\begin{cases}4x+3y=0\\-4x+by=2\end{cases}$ **inconsistent**.

   A) $b=-3$

   B) $b=0$

   C) $b=7$

   D) $b=3$

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

Question	**1**	**2**	**3**	**4**	**5**
Answer					

6A. Which of the following is **an invalid (wrong)** elementary row operation?

A) $Row\,2 \leftrightarrow Row\,3$

B) $4Row\,3 \rightarrow Row\,3$

C) $4Row\,1 + Row\,3 \rightarrow Row\,3$

D) $(Row3) + 4 \rightarrow Row3$

7. Given $A = \begin{bmatrix} -3 & 9 & 1 \\ -2 & 3 & 1 \end{bmatrix}$; $B = \begin{bmatrix} 4 \\ -1 \\ 5 \end{bmatrix}$. Find $A.B$, if possible.

A) $\begin{bmatrix} -16 \\ -6 \end{bmatrix}$

B) $\begin{bmatrix} -16 & -6 \end{bmatrix}$

C) $A.B$ is not defined

D) $\begin{bmatrix} -3 & 9 & 1 \\ -2 & 3 & 1 \\ 4 & -1 & 5 \end{bmatrix}$

8. $\cos\left(x - \frac{\pi}{2}\right) =$

A) $\cos x$

B) $\sin x$

C) $-\cos x$

D) $-\sin x$

9. $\sin^2 x + \tan^2 x + \cos^2 x =$

A) $\cos^3 x$

B) $\tan^2 x$

C) $\sec^2 x$

D) $\sin x$

10. Which matrix describes the augmented form the system? $\begin{cases} 3x = 4y - 5 \\ 2x + 4y - 4 = 0 \end{cases}$

A) $\begin{bmatrix} 3 & 4 & -5 \\ 2 & 4 & 4 \end{bmatrix}$

B) $\begin{bmatrix} 3 & -4 & 5 \\ 2 & 4 & 4 \end{bmatrix}$

C) $\begin{bmatrix} 3 & -4 & -5 \\ 2 & 4 & 4 \end{bmatrix}$

D) $\begin{bmatrix} 3 & 4 & 5 \\ 2 & 4 & -4 \end{bmatrix}$

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

Question	**6**	**7**	**8**	**9**	**10**
Answer					

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COURSE DETAILS:

ORIENTATION MATHEMATICS II	MATH 002	MAJOR EXAM II B
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GRADING:

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Questions							
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Q.1B (20 points) **Choose the correct answer**

1. Which matrix describes the augmented form the system? $\begin{cases} 3x = 4y - 5 \\ 2x + 4y - 4 = 0 \end{cases}$

A) $\begin{bmatrix} 3 & 4 & 5 \\ 2 & 4 & -4 \end{bmatrix}$

B) $\begin{bmatrix} 3 & -4 & -5 \\ 2 & 4 & 4 \end{bmatrix}$

C) $\begin{bmatrix} 3 & -4 & 5 \\ 2 & 4 & 4 \end{bmatrix}$

D) $\begin{bmatrix} 3 & 4 & -5 \\ 2 & 4 & 4 \end{bmatrix}$

2. Which of the following is **an invalid (wrong)** elementary row operation?

E) $(Row3) + 4 \rightarrow Row3$

F) $4Row\,1 + Row\,3 \rightarrow Row\,3$

G) $4Row\,3 \rightarrow Row\,3$

H) $Row\,2 \leftrightarrow Row\,3$

3. $\cos\left(x - \frac{\pi}{2}\right) =$

E) $-\sin x$

F) $\cos x$

G) $\sin x$

H) $-\cos x$

4. If A is a 4×4 matrix, B is a 3×4 matrix, and C is a 4×3matrix. Which of the following operations is **defined**?

A) $BA + C$

B) $AC + B$

C) $BC - A$

D) $CB + A$

5. $\sin^2 x + \tan^2 x + \cos^2 x =$

A) $\cos^3 x$

B) $\sec^2 x$

C) $\tan^2 x$

D) $\sin x$

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

Question	**1**	**2**	**3**	**4**	**5**
Answer					

6B. $\cos 60^\circ \cos 15^\circ - \sin 60^\circ \sin 15^\circ =$

A) $\sin 75^\circ$

B) $\sin 45^\circ$

C) $\cos 75^\circ$

D) $\cos 45^\circ$

7. Given that $(8,5)$ is a solution of the system: $\begin{cases} ax - 4y = 20 \\ 2x + by = 1 \end{cases}$. Find the values of a and b.

A) $a = 5$, $b = -3$

B) $a = 4$, $b = -5$

C) $a = -3$, $b = 5$

D) $a = 2$, $b = -4$

8. If $\sin\left(\sin^{-1}(x)\right) = x$, then $x \in$:

A) $[-1,1]$

B) $[0,\pi]$

C) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

D) $\mathbb{R}$

9. Find the value of b that makes the system: $\begin{cases} 4x + 3y = 0 \\ -4x + by = 2 \end{cases}$ **<u>inconsistent</u>**.

A) $b = 0$

B) $b = -3$

C) $b = 7$

D) $b = 3$

10. Given $A = \begin{bmatrix} -3 & 9 & 1 \\ -2 & 3 & 1 \end{bmatrix}$; $B = \begin{bmatrix} 4 \\ -1 \\ 5 \end{bmatrix}$. Find $A.B$, if possible.

E) $\begin{bmatrix} -16 & -6 \end{bmatrix}$

F) $\begin{bmatrix} -16 \\ -6 \end{bmatrix}$

G) $\begin{bmatrix} -3 & 9 & 1 \\ -2 & 3 & 1 \\ 4 & -1 & 5 \end{bmatrix}$

H) $A.B$ is not defined

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

Question	**6**	**7**	**8**	**9**	**10**
Answer					

Q.2 (6 points): Prove the identity.

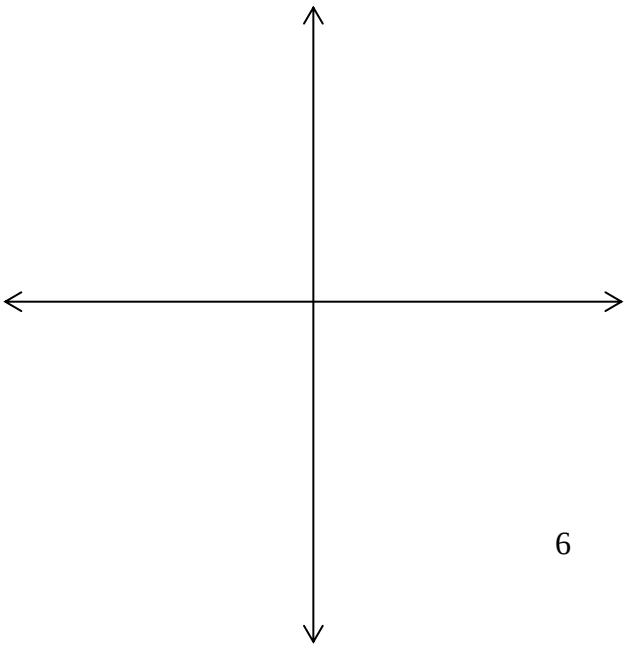
a) $\dfrac{\sec x+\csc x}{\tan x+\cot x}=\sin x+\cos x$

b) $\dfrac{\cos x}{1-\sin x}=\sec x+\tan x$

Q.3 (6 points): find the exact value of $\sin(\theta-\phi)$, given that $\tan\theta=\dfrac{4}{3}$, θ is in quadrant III, and $\sin\phi=-\dfrac{2}{5}$, ϕ is in quadrant IV.

Q.4 (7 points): Graph the solution set of the following system of inequalities. **Show all your work.**

$$\begin{cases} y<x^2+2 \\ x+y>1 \\ x\geq 0 \\ y\geq 0 \end{cases}$$



Q.5 (8 points): Find the solutions of the trigonometric equations. **Show all your work**

a) $3\cos(x)+\sqrt{2}=\cos(x)$; All solutions (in degrees)

b) $2\sin^2(x)-\cos(x)=1$; in the interval $[0,2\pi)$

Q.6 (5 points): Use an Addition or Subtraction Formula to find the exact value. **Show all your work**

a) $\sin(165^\circ)$

b) $\cos\left(\frac{5\pi}{12}\right)$

Q.7 (3+3+2 points): Let $A=\begin{bmatrix}2 & 5\\ -1 & 3\\ 2 & -1\end{bmatrix}$, $B=\begin{bmatrix}5 & 1\\ -2 & 3\end{bmatrix}$ and $C=\begin{bmatrix}1 & -2\\ 0 & 3\end{bmatrix}$

Perform the indicated operation, if possible.

a) $4B+3C$

b) $A.C$

c) A^2

Q.8 (7 points): Use **Elimination (Addition) Method** to solve the following system. $\begin{cases} 2x + y + z = 7 \\ x + y - z = 4 \\ -x - 2y + 3z = -2 \end{cases}$

Q.9 (8 points): Solve the following system using **Gaussian Elimination**: $\begin{cases} x + y - z = 0 \\ x + 2y - 3z = -3 \\ 2x + 3y - 4z = -3 \end{cases}$

(With back substitution OR Gauss –Jordan)

Q.10 (5 points): Solve for x and y . $\begin{bmatrix} 3x & 5 \\ -1 & 4x \end{bmatrix} + \begin{bmatrix} 2y & -3 \\ -6 & -y \end{bmatrix} = \begin{bmatrix} 7 & 2 \\ -7 & 2 \end{bmatrix}$. **Show all your work**