# Prince Sultan University

Deanship of Educational Services

Department of Mathematics and General Sciences

## COURSE DETAILS:

| ORIENTATION MATHEMATICS II A | MATH 002 | MAJOR EXAM II |
|---|---|---|
| Semester: | Fall Semester --Term 181 | |
| Date: | Sunday November 18, 2018 | |
| 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** | **24** | **19** | **17** | **80** | **20** |

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

1) Solve the equation $\sin x = -\frac{1}{2}$ on the interval $0° \le x < 360°$

A) $x = 30°, 150°$

B) $x = 210°, 330°$

C) $x = 60°, 120°$

D) $x = 240°, 330°$

2) The exact value of $\sin^{-1}\left(\sin\frac{4\pi}{3}\right) =$

A) $-\frac{2\pi}{3}$

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

C) $-\frac{\pi}{3}$

D) $\frac{4\pi}{3}$

3) $\cos(\pi + \theta) =$

A) $-\cos\theta$

B) $\sin\theta$

C) $-\tan\theta$

D) $\cos\theta$

4) The expression $\sin\left(\frac{\pi}{6}\right)\cos\left(\frac{\pi}{3}\right) + \sin\left(\frac{\pi}{3}\right)\cos\left(\frac{\pi}{6}\right) =$

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

B) $\sin\frac{\pi}{18}$

C) $\sin\frac{\pi}{2}$

D) $-\sin\frac{\pi}{6}$

5) Find the **range** for the function: $y = 2\cos(3x - \pi) + 4$

A) $[2, 6]$

B) $[-2, 2]$

C) $[-3, 3]$

D) $[3, 5]$

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

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

6) Solve the following system: $\begin{cases} y = 4x - 4 \\ 6x + 3y = 24 \end{cases}$

A) $(0, -4)$

B) $(1, 0)$

C) $(-1, -8)$

D) $(2, 4)$

7) Which one the following is a correct identity?

A) $\cot\theta \sec\theta = \sin\theta$

B) $\cot\theta \sec\theta = \sec\theta$

C) $\cot\theta \sec\theta = \csc\theta$

D) $\cot\theta \sec\theta = \tan\theta$

8) The following system of two linear equations: $\begin{cases} 2x + 3y = 4 \\ 4x + 6y = 10 \end{cases}$ has:

A) one solution

B) two solutions

C) infinitely many solutions

D) no solution

9) The expression $\cos 80° \cos 40° + \sin 80° \sin 40°$ is equivalent to:

A) $\sin 120°$

B) $\sin 50°$

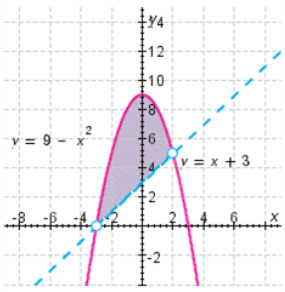
C) $\cos 120°$

D) $\cos 80°$

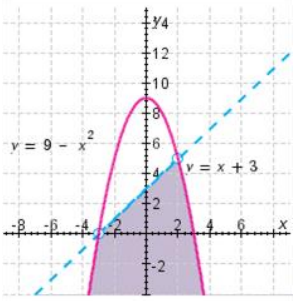
10) Which of the following is the graph of the solution set of the system of inequalities? $\begin{cases} y < 9 - x^2 \\ y \geq x + 3 \end{cases}$

**(The solution set is the shaded region)**

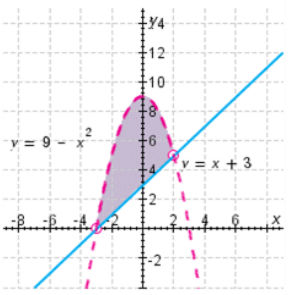
A)



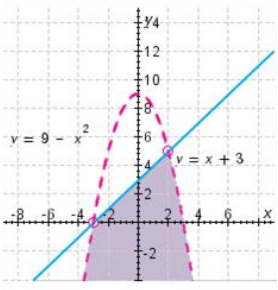

B)




C)




D)

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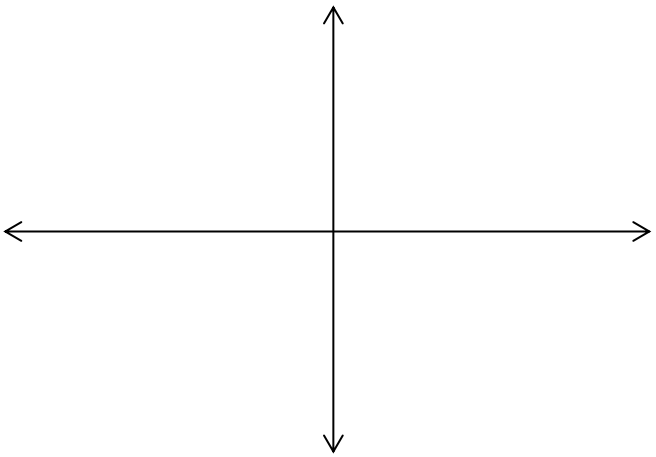
| **Question** | **6** | **7** | **8** | **9** | **10** |
|---|---|---|---|---|---|
| **Answer** | | | | | |

**Q.2 (6 points):** Given that $\csc\alpha = \frac{5}{2}$, where $\alpha$ is in Quadrant *II*, and $\cot\beta = -3$, where $\beta$ is in Quadrant *IV*, find the value of $\sin(\alpha - \beta)$.

**Q.3 (5 points):** Verify the trigonometric identity $\tan\theta + \cot\theta = \sec\theta\csc\theta$.

**Q.4 (8 points):** Determine the amplitude, period and phase shift of the following function. Then graph one period of the function: $y = \frac{1}{2}\sin(2x + \pi)$.



**Q.5 (5 points):** Use a sketch to find the exact value of the function: $\cos\left(\tan^{-1}(-\frac{2}{3})\right)$.

**Show all your steps**

**Q.6 (7 points):** Solve the equation $2\sin^2 x + 3\cos x = 0$ on the interval $0° \le x < 360°$.

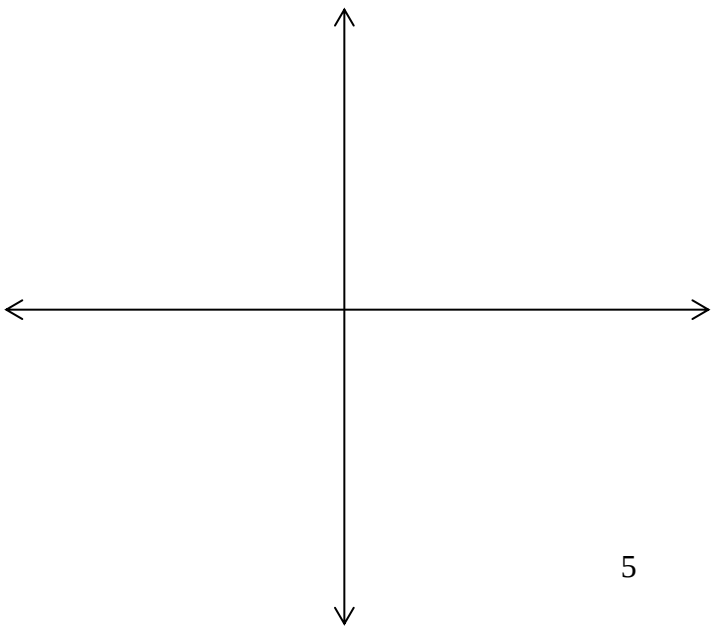
**Q.7 (7 points):** Solve the equation $4\sin(3x) = \sqrt{2} + 2\sin(3x)$ on the interval $0° \le x < 360°$.

**Q.8 (5 points):** Solve the following system: $\begin{cases} \frac{x}{6} - \frac{y}{2} = \frac{1}{3} \\ x = 3y + 2 \end{cases}$ and identify, if there is one solution, no solution or infinitely many solution. Express your solution in the form of solution set.

**Q.9 (9 points):** Solve the system of linear equations: $\begin{cases} x - y + z = -4 \\ x + y + z = -2 \\ 4x + 2y + z = 5 \end{cases}$

**Q.10 (8 points):** Graph the solution set of the following system of inequalities. **Show all your work**

$$\begin{cases} x^2 + (y-1)^2 < 16 \\ x + y > 2 \\ y \geq 0 \end{cases}$$



# Prince Sultan University

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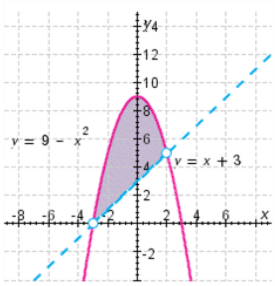
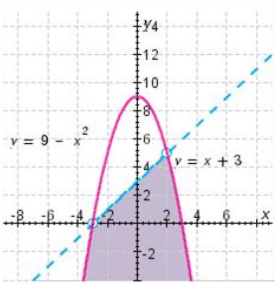
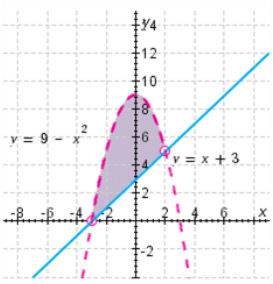
## Q.1B (20 points) Choose the correct answer

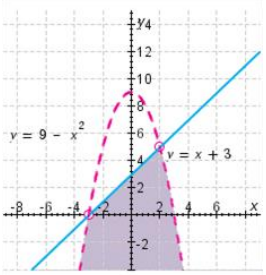
1) Which of the following is the graph of the solution set of the system of inequalities? $\begin{cases} y < 9 - x^2 \\ y \geq x + 3 \end{cases}$

**(The solution set is the shaded region)**

A) 


B) 


C) 


D) 


2) Find the **range** for the function: $y = 2\cos(3x - \pi) + 4$

A) $[3,5]$
B) $[-3,3]$
C) $[2,6]$
D) $[-2,2]$

3) The expression $\cos 80° \cos 40° + \sin 80° \sin 40°$ is equivalent to:

A) $\cos 120°$
B) $\cos 80°$
C) $\sin 120°$
D) $\sin 50°$

4) Solve the following system: $\begin{cases} y = 4x - 4 \\ 6x + 3y = 24 \end{cases}$

A) $(-1,-8)$
B) $(0,-4)$
C) $(2,4)$
D) $(1,0)$

5) Which one the following is a correct identity?

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B) $\cot\theta \sec\theta = \tan\theta$
C) $\cot\theta \sec\theta = \sin\theta$
D) $\cot\theta \sec\theta = \sec\theta$

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

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