Prince Sultan University
Department of Mathematical Sciences

MATH 002
Major II Examination
Semester II, Term 162
Monday, May 01, 2017
Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____ Section #: _____

Teacher's Name: _____

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt of cheating may cause you expulsion from the Exam.
7. This examination has 8 problems, some with several parts and a total of 5 pages including the cover page. Make sure your exam paper has all these pages with all the problems.

Problems	Max points	Student's Points
1 , 2	21	
3 , 4	21	
5 , 6	20	
7 , 8	18	
Total	80	

20

Q.1 (15 points): Verify the identity. **(Show all the steps)**

a) $\dfrac{\cos\theta}{1-\sin\theta} = \sec\theta + \tan\theta$

b) $\dfrac{1}{1+\cos x} + \dfrac{1}{1-\cos x} = 2 + 2\cot^2 x$

c) $\cos\left(x+\dfrac{\pi}{6}\right) - \sin\left(x+\dfrac{\pi}{3}\right) = -\sin x$

Q.2 (6 points) Given that $\tan\alpha = -\dfrac{15}{8}$ where α lies in quadrant II, and $\cos\beta = \dfrac{5}{13}$ where β lies in quadrant IV. Find the exact value of $\sin(\alpha+\beta)$

Q.3 (12 points): Find the **exact** value. **(Show all your steps. Don't use a calculator directly)**

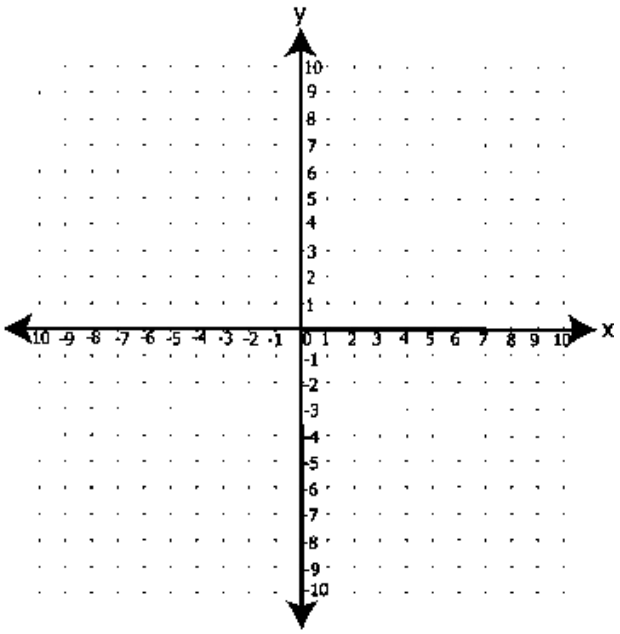
a) $\cos\left(\frac{7\pi}{12}\right)$

b) $\sin(240^\circ + 45^\circ)$

c) $\sin(35^\circ)\cos(5^\circ) - \cos(35^\circ)\sin(5^\circ)$

Q.4 (9 points): Graph the solution set of the system of inequalities. **Show all your steps**

$$\begin{cases} 4x + y \le 8 \\ 2x - 3y > -12 \\ y \ge x^2 - 4 \end{cases}$$



Q.5 (15 points): Solve the following trigonometric equations:

a) $2\sqrt{3}\cos x.\sin x = 3\cos x \quad , \quad 0 \le x < 2\pi$

b) $3\sin^2\theta = \cos^2\theta \qquad , \qquad 0 \le \theta < 360^\circ$

c) $\sqrt{2}\cos(2x) = 1 \qquad , \qquad 0 \le x < 2\pi$

Q.6 (5 points): Find the linear function $f(x) = mx + b$ if the graph of the line passes through the points $(-2,15)$ and $(4,-21)$

Q.7 (8 points): Use the **Addition-Elimination Method** to solve the following system of linear equations.

$$\begin{cases} x+y=-2 \\ -5x+5y-2z=-24 \\ x-z=5 \end{cases}$$

Q.8 (10 points): Use **Matrices (Gaussian Elimination with back-substitution or Gauss-Jordan Elimination)** to solve the system of linear equations.

$$\begin{cases} x+y+4z=2 \\ 2x+3y+6z=0 \\ -x-y+2z=-14 \end{cases}$$