

Prince Sultan University
Department of Mathematical Sciences



MATH 002
Final Examination
Semester II, Term 162
Saturday, May 20, 2017
Time Allowed: 3 hours

Student Name: _____

Student ID #: _____

Section

Dr. Thabet		Dr. Bahaa'	Dr. Nabil		Mr. Khaled		Dr. Jehad
1 --- 2p.m.	11----12	10 ----11	9 --- 10	10 ---11	11 ---- 12	8 --- 9	8 ----9
398	399	545	403	404	397	544	402

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. If your mobile phone is seen or heard, your exam will be taken immediately.
6. You must show all your work beside the problem. Be organized.
7. You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
8. This examination has 18 problems. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3	13	
4,5,6,7,8	20	
9,10	14	
11,12,13	18	
14,15	15	
16,17,18	20	
Total	100	

40

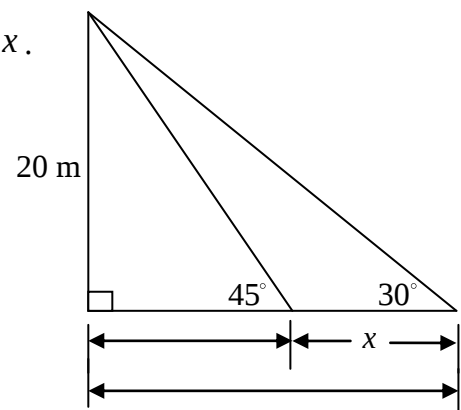
Q.1 (6 points) Find the **solution set** for each of the following equations.

a) $3^{2x} + 3^x - 2 = 0$

b) $\log_2(x-3) = 2 + \log_2(x+2) - \log_2(x)$

Q.2 (3 points) Let $f(x) = \log_5(x+1) - 2$. Find $f^{-1}(x)$.

Q.3 (4 points) (4 points) Use the graph to find the value of **distance** x .



Q.4 (3 points) Fill in the required information.

Function	Domain	Range	Horizontal Asymptote equation, if any	Vertical Asymptote equation, if any
$f(x) = 4 - \log_5(x + 3)$				
$f(x) = -2e^{x-1} + 6$				

Q.5 (3 points) In a circle of radius 20 centimeters, find the **length of the arc** intercepted by a central angle measuring 75° . (Round your answer to 2 decimal places)

Q.6 (4 points) If $\sin \theta = \frac{1}{4}$ and θ is acute angle, find the **exact value of** $\cos\left(\theta + \frac{\pi}{3}\right)$.

Q.7 (6 points) Given $\tan \theta = -\frac{2}{5}$ and $\csc \theta > 0$, find the exact value of the **remaining trigonometric functions of θ**

Q.8 (4 points) The formula $C = 15750 + 5259 \ln(x)$ models the average cost of a new car x years after 2010. **When (what year)** will the average cost of a new car be \$30,000?

Q.9 (6 points) Find the **exact** value. **Show all your steps and don't use a calculator directly.**

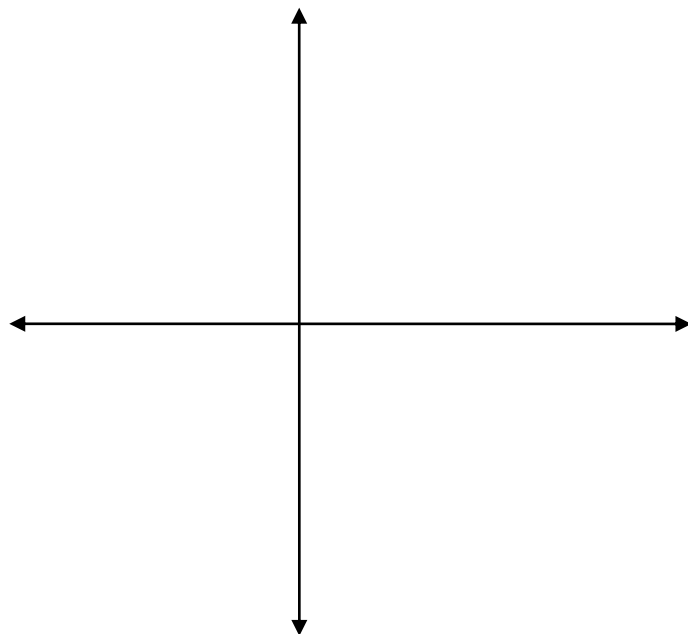
a) $\cot\left(\frac{71\pi}{3}\right)$

b) $\sin(315^\circ)$

c) $\sin 17^\circ \cos 43^\circ + \cos 17^\circ \sin 43^\circ$

Q.10 (8 points) Determine the **amplitude, period, and phase shift**, then graph one period of:

$$y = 3\sin\left(2x - \frac{\pi}{2}\right) + 2$$



Q.11 (6 points) **Solve** the trigonometric equation: $3 \tan^3 x = \tan x$, $0 \leq x < 2\pi$

Q.12 (4 points) **Verify** the identity: $\frac{\sec \theta - \sin \theta \tan \theta}{\cos \theta} = 1$

Q.13 (8 points) Given $A = \begin{bmatrix} 0 & -2 & 4 \\ 2 & 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ -1 & -4 \\ 1 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & -6 \\ 4 & -11 \end{bmatrix}$. **Find the following.**

a) $A \cdot B - 3C$

b) C^{-1}

Q.14 (8 points) Given $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$. Find **the inverse matrix, A^{-1} , if it exists.**

Q.15 (7 points) **Solve** the following system using the **method of your choice.**

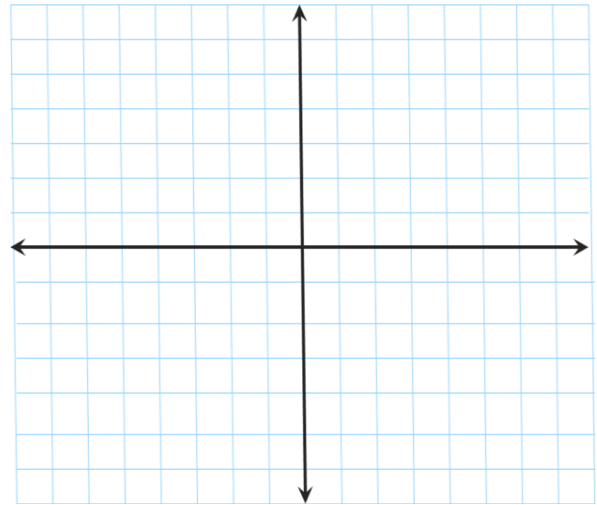
$$2x + 6y + z = 2$$

$$-y - z = 3$$

$$-x - 2y + z = -1$$

Q.16 (8 points) Consider the equation: $16x^2 + 4y^2 - 32x + 16y - 32 = 0$

- Write the **equation in standard form**.
- Determine the **center and the vertices**.
- Graph** the equation and **locate the foci**.



Q.17 (5 points) Let $x = 4$ be the equation of the directrix and $(-2, 3)$ be the focus of the parabola. Write the **standard equation** of the parabola.

Q.18 (7 points) **Graph** the solution set of the system of inequalities

(Make sure to determine the **region of the solution set** and show it on **graph**)

$$\begin{cases} x + y \leq 2 \\ -2 \leq x < 1 \\ y \geq -3 \end{cases}$$

