Prince Sultan University
Department of Mathematical Sciences

MATH 002
Final Examination
Semester I, Term 151
Monday, January 4, 2016
Time Allowed: 150 minutes

Student Name: _____

Student ID #: _____

Circle your Instructor's Name And Class Time:	Jamiiru 8am	Jamiiru 10am	Ahmed 9am	Ahmed 1pm	Abid 9am	Abid 11am	Mohammed 10am

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 21 problems. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1-4	16	
5-8	18	
9-11	16	
12-13	12	
14-15	12	
16-18	14	
19-21	12	
Total	100	
Total	50	

Q.1 (4 points) Sketch the graph of $f(x) = -e^{x-2} - 1$ using transformations. Show the location of the asymptote. **Find the Domain and Range.**

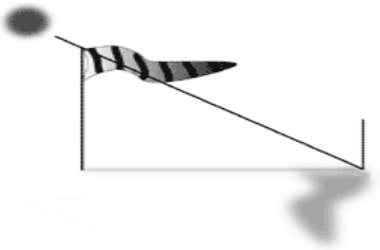
Q.2 (4 points) Find the domain of $f(x) = \ln\left(x^2 - 10x + 21\right)$

Q.3 (4 points) Expand the following logarithm, as much as possible: $\ln \dfrac{\sqrt{x}\, e^{x-2} (x-2)^3}{\sqrt[5]{x+4}}$

Q.4 (4 points) Solve $e^{2x} + 3e^{x} - 28 = 0$

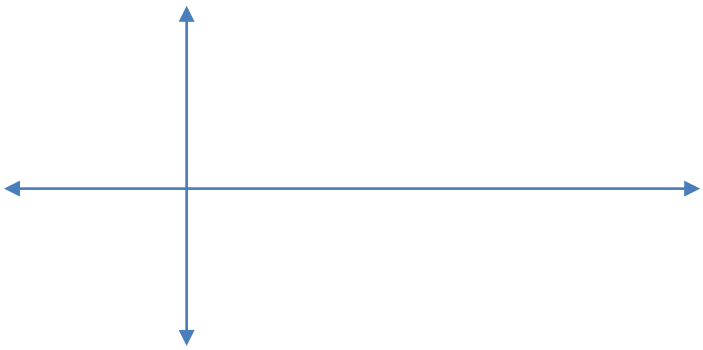
Q.5 (4 points) Given that $\sec\theta = -\frac{\sqrt{13}}{2}$ and θ lies in Quadrant 3, find the value of each of the remaining trigonometric functions.

Q.6 (4 points) in 1915, the tallest flagpole in the world stood in San Francisco. When the angle of elevation of the sun was 55°, the length of the shadow cast by the flagpole was 210ft. Find the height of the flagpole.



Q.7 (4 points) Find the value of $\sec\left[\sin^{-1}\left(-\frac{5}{12}\right)\right]$, **without using a calculator**. Show all your steps.

Q.8 (6 points) Find the amplitude, period and phase shift of the function, and then graph the function: $y = -2\cos\left(3x - \frac{\pi}{4}\right)$.



Q.9 (4 points) Verify the identity: $\dfrac{\sec\theta}{\tan\theta}+\dfrac{\csc\theta}{\cot\theta}=\csc\theta+\sec\theta$

Q.10 (6 points) Solve the following trig equations on the interval $[0,2\pi)$:

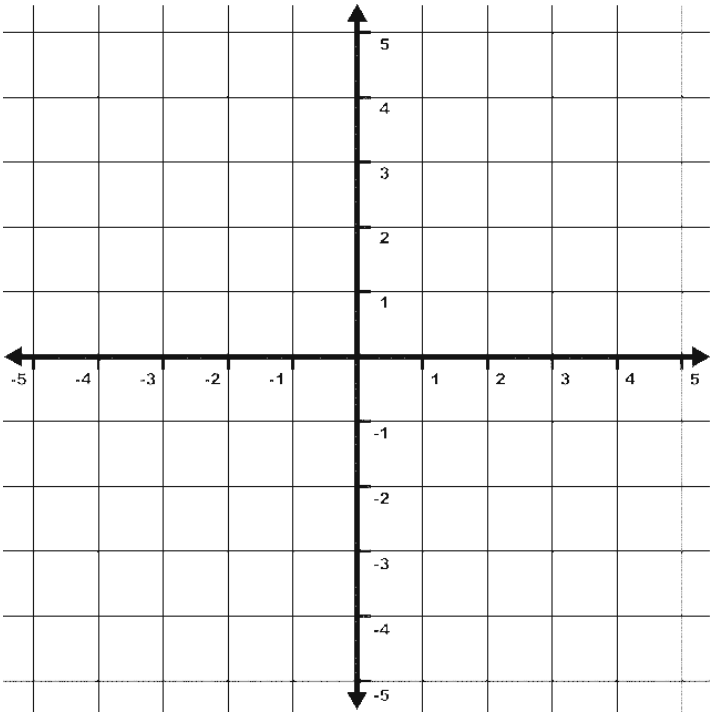
a) $\cos(3x)=-\dfrac{\sqrt{3}}{2}$

a) $2\sin^2 x+5\sin x-3=0$

Q.11 (6 points) Given that $\tan\alpha=\dfrac{4}{7}$ where α lies in quadrant 1, and $\sin\beta=\dfrac{-2}{5}$ where β lies in quadrant 3, find the value of $\sin(\alpha+\beta)$

Q.12 (6 points) Graph the solution set of the following system of inequalities:

$$\begin{cases} 3x-2y \le 6 \\ -3 \le x \le 2 \\ (x-1)^2+(y-1)^2 < 9 \end{cases}$$



Q.13 (6 points) Use Gauss-Jordan to solve the system: $\begin{cases} 2x+y+4z=21 \\ x-y+2z=6 \\ 3x+y-z=9 \end{cases}$

Q.14 (1+3 points) What type of solution is represented by the reduced matrix? $\left[\begin{array}{ccc|c} 1 & 1 & 2 & -3 \\ 0 & 1 & 4 & 2 \\ 0 & 0 & 0 & 0 \end{array}\right]$

Write the solution set of the system represented by this matrix, if any.

Q.15 (2+2+4 points) Let $A = \begin{bmatrix} 1 & -1 \\ 3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 2 & 4 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 1 \\ -1 & 3 \\ 2 & 2 \end{bmatrix}$

a. Find A^2

b. Find B^2

c. Solve the matrix equation for X: $2X - 6A^{-1} = BC$

Q.16 (4 points) Use inverse of the coefficient matrix to solve $\begin{cases} x-y+z &= 8 \\ 2y-z &= -7 \\ 2x+3y &= 1 \end{cases}$

Given that the inverse of $\begin{bmatrix} 1 & -1 & 1 \\ 0 & 2 & -1 \\ 2 & 3 & 0 \end{bmatrix}$ is $\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$

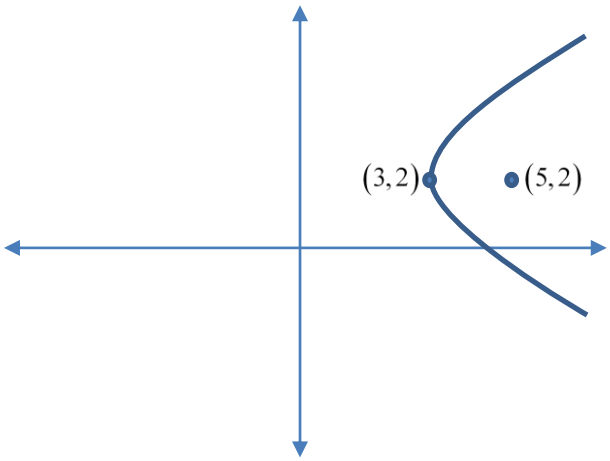
Q.17 (6 points) Use Cramer's Rule to find the value of x only: $\begin{cases} x+2y-z=3 \\ x+2z=1 \\ 2x-y+4z=1 \end{cases}$

Do not find the values of *y* and *z*.

Q.18 (4 points) Evaluate the determinant $\begin{vmatrix} 1 & 0 & 2 & 1 \\ 3 & 0 & 1 & 0 \\ 2 & 5 & 1 & 1 \\ 0 & 1 & 0 & 4 \end{vmatrix}$

Q.19 (3 points) Find the standard form of the equation of the ellipse with a vertical major axis of length 16, and a minor axis of length $2\sqrt{3}$, and center at $(1,-3)$.

Q20 (3 points) A parabola with its vertex and focus is shown below. Draw the Directrix of the parabola shown on the graph, give the equation of the Directrix and find the length of the Latus Rectum.



Q.21 (6 points) For the conic section: $9y^2-4x^2-18y+24x-63=0$, find the coordinates of the center, vertices and foci. **Then sketch the graph.**