Prince Sultan University
Department of Mathematical Sciences

MATH 002
Final Examination
Semester II, Term 132
Monday, May 26, 2014
Time Allowed: 150 minutes

Student Name: _____

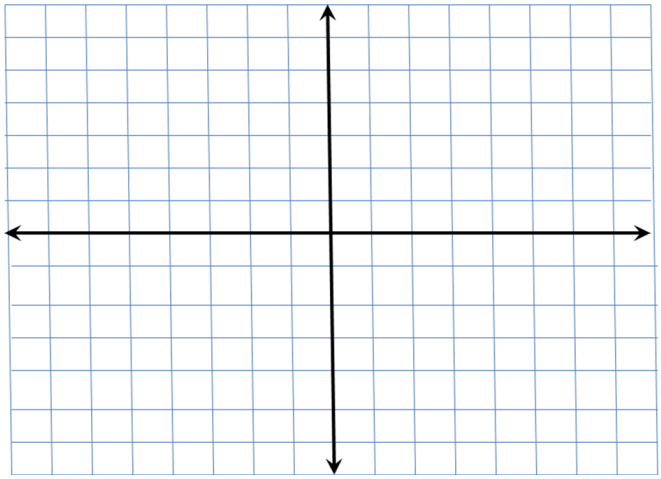
Student ID #: _____ Section #: _____

Teacher's Name: _____

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

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

Q.1 (4 points) Sketch the graph of $f(x) = e^{(x+2)} - 3$ using transformations. Show the location of the asymptote. **Find the Domain and Range and *x* and *y* intercepts, if any.**



Q.2 (4 points) Find the domain of $f(x) = \ln\left(x^2 + 3x - 10\right)$

Q.3 (4 points) Express as a single logarithm: $\frac{1}{4}\ln(x+2)^2 - \frac{1}{3}\left[\ln x^2 + \ln(x+3)^3\right]$

Q.4 (4 points) Given that $\cos\theta = \frac{1}{3}$ and $270^\circ < \theta < 360^\circ$, find the **<u>exact</u>** value of each of the **remaining trigonometric functions**.

Q.5 (8 points) Solve each of the following equations:

(a) $\log_2(x+2) - \log_2(x-5) = 3$

(b) $5^{x^2-12} = 25^{2x}$

Q.6 (4 points) Use a right triangle to write $\sec\left[\sin^{-1}\left(\frac{x}{\sqrt{x^2+25}}\right)\right]$ as an algebraic expression. Assume that $x > 0$ and the inverse function is defined for the expression given.

Q7. (4 points) Find the exact value of $\cos 53^\circ \cos 38^\circ + \sin 53^\circ \sin 38^\circ$, **without using a calculator.**

Q.8 (8 points) Determine the amplitude, period, and phase shift of the function then **graph one period.** $y = \frac{1}{2}\cos\left(3x + \frac{\pi}{2}\right)$.

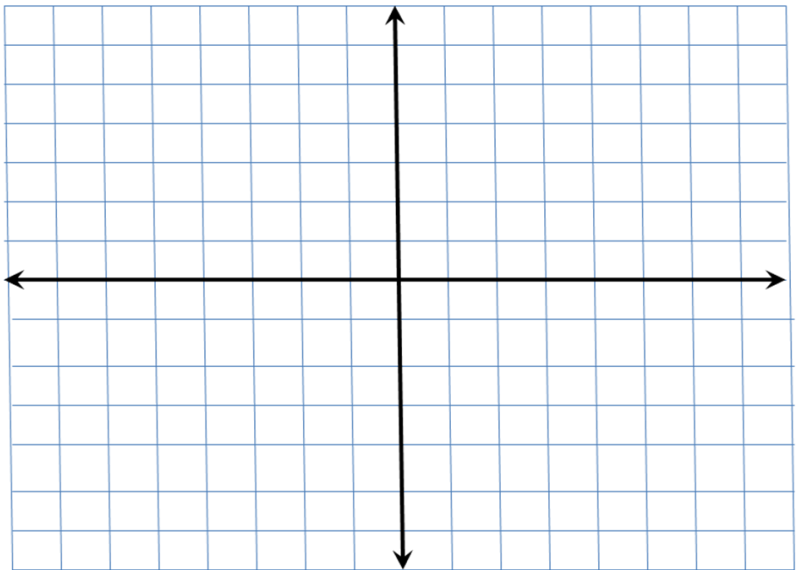
Q.9 (6 points) Verify the following identities

i) $\frac{\sin t}{\tan t} + \frac{\cos t}{\cot t} = \sin t + \cos t$

ii) $(2\cos\theta - 3\sin\theta)^2 + (3\cos\theta + 2\sin\theta)^2 = 13$

Q.10 (6 points) Graph the solution set of the following system of inequalities:

$$\begin{cases} y - x^2 \geq 0 \\ x^2 + y^2 < 4 \end{cases}$$



Q.11 (4 points) Evaluate the determinant $\begin{vmatrix} 4 & 2 & 8 & -7 \\ -2 & 0 & 4 & 1 \\ 5 & 0 & 0 & 5 \\ 4 & 0 & 0 & -1 \end{vmatrix}$

Q.12 (10 points) Let $A=\begin{bmatrix}0 & 1 & -2\\ 1 & 2 & 0\end{bmatrix}$, $B=\begin{bmatrix}1 & 3\\ 2 & 2\\ -1 & 1\end{bmatrix}$ and $C=\begin{bmatrix}2 & -2\\ 1 & -3\end{bmatrix}$

a. Find C^2

b. Find B^2

c. Find AB

d. Solve the matrix equation for X : $2X-3C^2=-2I_2$

Q.13 (10 points) Use Cramer's Rule to solve the system of linear equations: $\begin{cases} x+2z=4 \\ 2y-z=5 \\ 2x+3y=13 \end{cases}$

Q.14 (10 points) Use A^{-1}(the inverse of the coefficient matrix) to solve the system

$$\begin{cases} x - y + z = 8 \\ 2y - z = -7 \\ 2x + 3y = 1 \end{cases}$$

Q.15 (6 points) Find the standard form of the equation of the ellipse with a vertical major axis of length 10, and a minor axis of length 4, and center at $(-2,3)$.

Q.16 (8 points) For the conic section: $4x^2 - y^2 + 32x + 6y + 39 = 0$, find the coordinates of the center, vertices and foci. Then sketch the graph.