Prince Sultan University
Department of Mathematical Sciences

MATH 002
Final Examination
Semester I, Term 141
Tuesday, January 6, 2015
Time Allowed: 120 minutes

Student Name: _____

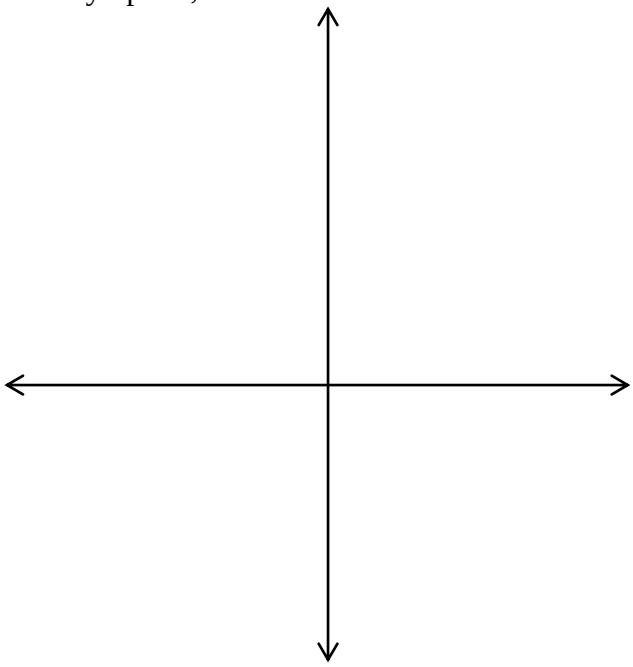
Student ID #: _____ Section #: _____

Section					
Dr. Kamal	Dr. Nabil			Mr. Khaled	
9 ---- 10	10 ---- 11	1---- 2	2 ---- 3	8 ---- 9	11 ---- 12
217	218	220	221	216	219

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

Problems	Max points	Student's Points
1,2,3,4	19	
5,6,7	17	
8,9	14	
10,11,12	15	
13,14	16	
15,16,17	19	
Total	100	

Q.1 (6 points) **Sketch** the graph of $f\left(x\right)=-e^{x-1}+3$. Show the asymptote, find the Domain and Range.



Q.2 (4 points) Find the domain of $f\left(x\right)=\ln\left(\frac{x-1}{x+2}\right)$

Q.3 (3 points) Expand the following logarithmic expression as much as possible, $\log_2\left[\frac{\sqrt{x}\left(x-3\right)}{64\left(x+1\right)^{2/3}}\right]$

Q.4 (6 points) Given that $\sec\theta=3$ and $270°<\theta<360°$, find the values of the **remaining trigonometric functions**.

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

(a) $\ln(x-5)-\ln(x+4)=\ln(x-1)-\ln(x+2)$

(b) $(4)^{x}\left(\frac{1}{2}\right)^{-x+1}=8$

Q.6 (4 points) A tower is 555 feet tall. To the nearest degree, find the angle of elevation from a point 150 feet away from the base of the tower to the top of the tower.

Q.7 (5 points) Write $\sec\left[\sin^{-1}\left(\frac{x}{\sqrt{x^{2}+4}}\right)\right]$ as an algebraic expression. Assume that $x>0$ and the inverse function is defined for the expression given.

Q8. (6 points) Find the exact value. **Show all your steps and don't use a calculator directly.**

a. $\sin\left(-\frac{17\pi}{3}\right)$

b. $\cos(285^\circ)$

Q.9 (8 points) Determine the **amplitude**, **period**, and **phase shift**. Then **graph** one period of the function: $y = -2\cos\left(\frac{\pi}{2}x - 3\pi\right)$

Q.10 (4 points) Verify the identity: $\dfrac{\cos(x)}{1-\sin(x)} = \sec(x) + \tan(x)$

Q.11 (4 points) Simplify $\cos(\alpha+\beta)\cos\beta + \sin(\alpha+\beta)\sin\beta$

Q.12 (7 points) Use Gaussian elimination to find the solution set of the system. $\begin{cases} 3x - 4y - z = 3 \\ 2x - 3y + z = 3 \\ x - 2y + 3z = 3 \end{cases}$

Q.13 (9 points) Perform the indicated operation, if possible given

$$A=\begin{bmatrix}-3 & 2\\ -5 & 4\end{bmatrix},\ B=\begin{bmatrix}3 & 1\\ -1 & 5\\ 6 & 0\end{bmatrix},\text{ and }\ C=\begin{bmatrix}2 & -6\\ 4 & -8\end{bmatrix}$$

a. $B \cdot A$

b. $-5B+4C$

c. Solve for matrix X in the equation: $C \cdot X - 3A = 2I_2 \cdot C$

Q.14 (7 points) Use Cramer's Rule to **<u>find the value of y</u>**: $\begin{cases} 2y - z = -5 \\ x - y - z = 2 \\ x - y + 2z = 5 \end{cases}$

Q.15 (4 points) Solve the system of linear equations $\begin{cases} x+2y+5z=1 \\ 3x+5y+9z=2 \\ x+y-2z=1 \end{cases}$ given that the inverse of the coefficient matrix is: $\begin{bmatrix} -19 & 9 & -7 \\ 15 & -7 & 6 \\ -2 & 1 & -1 \end{bmatrix}$

Q.16 (6 points) Find the standard form of the equation of the ellipse with a horizontal major axis of length 12, and a minor axis of length 6, and center at $(3,-2)$. **Graph** the ellipse.

Q.17 (9 points) Find the center, vertices, foci, and the equations of the asymptotes for the conic section with the following equation: $x^2-9y^2+4x-18y-41=0$. **Don't Graph.**