Prince Sultan University
Orientation Mathematics Program

MATH 002
Final Examination
Semester I, Term 101
Tuesday, January 25, 2011
Time Allowed: 120 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	18	
4,5,6	17	
7,8	10	
9,10	12	
11,12	12	
13,14	17	
15,16	14	
Total	100	

1) (8 points) Given $f(x) = 5^{-x} - 3$, Find each of the following.

(a) Domain of *f*

(b) Range of *f*

(c) Equation of horizontal asymptote

(d) *x*-intercept (to the nearest tenth)

(e) *y*-intercept

2) (5 points) Write the expression $\frac{1}{2}\ln x - 3\ln y - \ln(z - \ln e^2)$ as a single logarithm whose coefficient is 1. (Evaluate when possible).

3) (5 points) From a point on level ground 30 feet from the based of a building, the angle of elevation is 56^{o}. Approximate the height of the building to the nearest foot.

4) (6 points) Given $\theta = \frac{-37\pi}{6}$, find each of the following.

(a) The reference angle of θ

(b) Use the reference angle obtained in part a) to find the value of $(\cot\theta - 2\sec\theta)$ without using a calculator.

5) (6 points) Given $f(x) = -3\cos(\frac{4x-\pi}{2})$, find the coordinates of the five key points in the first period.

x					
$f(x)$					

6) (5 points) Write $\sin\left(\cos^{-1}\frac{x}{3}\right)$ as an algebraic expression. Assume that $x > 0$ and $\frac{x}{3}$ is in the domain of the inverse cosine function.

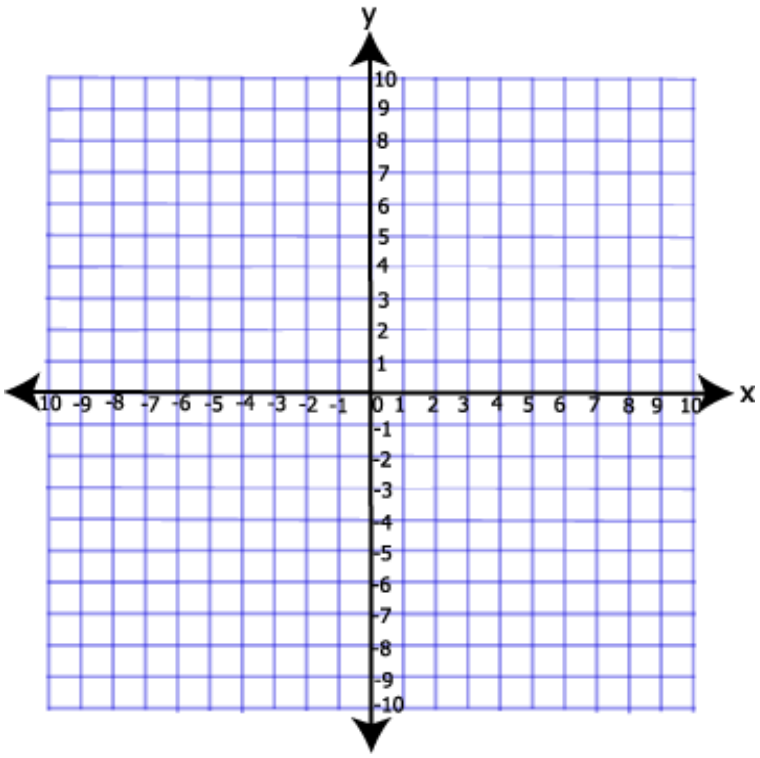
7) (4 points) Verify the following identity.

$-\cos^2\theta\left(1+\tan^2\theta\right)=-1.$

8) (6 points) Use the substitution or addition method to solve the following system of linear equations: $\begin{cases}\frac{2x}{3}+\frac{y}{5}=6\\ \frac{x}{6}-\frac{y}{2}=-4\end{cases}$.

9) (6 points) Graph the solution set of the given system of inequalities.

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



10) (6 points) Evaluate the determinant $\begin{vmatrix} 0 & -4 & 1 & 0 \\ 0 & 0 & 3 & 2 \\ -5 & 0 & 2 & 4 \\ 3 & 6 & 7 & 0 \end{vmatrix}$

11) (7 points) Find the multiplicative inverse of the matrix: $\begin{bmatrix} 15 & 4 & -5 \\ -12 & -3 & 4 \\ -4 & -1 & 1 \end{bmatrix}$

12) (5 points) Solve the following system of linear equations using the inverse matrix.

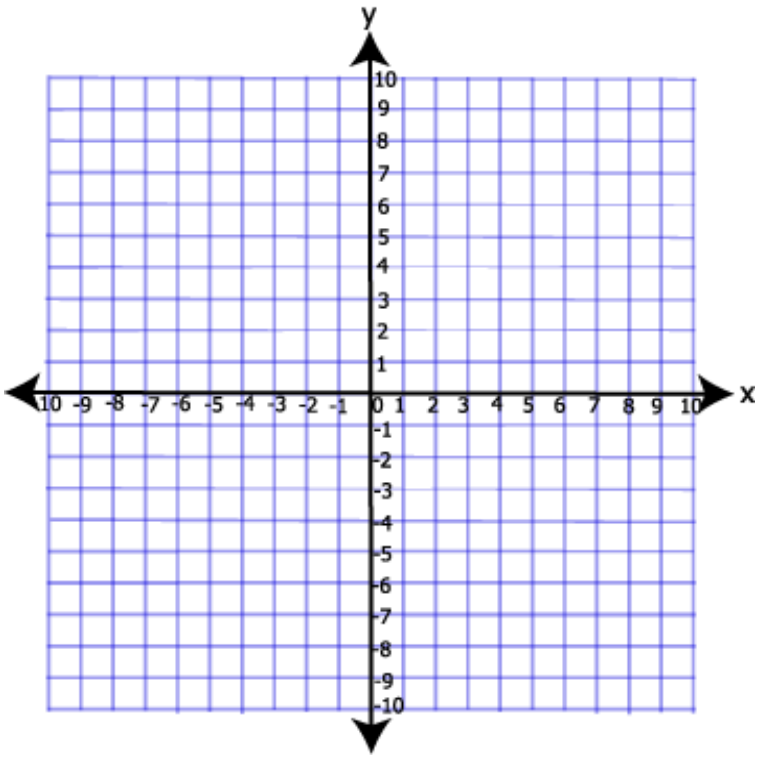
$$\begin{cases} 2x - y - z = -3 \\ 12x - 7y - 2z = -5 \\ -5x + 3y + z = 3 \end{cases}$$

given that the inverse of $\begin{bmatrix} 2 & -1 & -1 \\ 12 & -7 & -2 \\ -5 & 3 & 1 \end{bmatrix}$ is $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 8 \\ -1 & 1 & 2 \end{bmatrix}$

13) (10 points) Use Cramer's rule to solve the system: $\begin{cases} 3x+3=2z-y \\ 7y+3z=9-2x \\ 4x-3y-z-7=0 \end{cases}$

14) (7 points) Find the standard form of the equation of the ellipse with foci: $(-4,2)$, $(6,2)$ and endpoints of major axis (vertices): $(-8,2)$, $(10,2)$.

15) (7 points) Graph the parabola $(y+2)^2+12x-84=0$ and give its vertex, focus, and directrix.



16) (7 points) Give the coordinates of the foci and the equations of the asymptotes of the hyperbola $16y^2-9x^2+96y+90x-225=0$.