Prince Sultan University
Department of Mathematical Sciences

MATH 002
Final Examination
Semester I, Term 161
Monday, January 23, 2017
Time Allowed: 3 hours

Student Name: _____

Student ID #: _____

Circle your Instructor's Name:	Dr. Wasfi	Dr. Nabil	Dr. Mohammed	Mr. Abid 8am	Mr. Abid 11am

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
1-4	18	
5-8	20	
9-11	13	
12-13	11	
14-15	16	
16-17	22	
Total	100	
Total	40	

Q.1 (6 pts) Use transformations of the graph of $f(x) = \left(\frac{1}{2}\right)^x$ to sketch the graph of

$f(x) = -\left(\frac{1}{2}\right)^{x-1} - 2$. Show the location of the asymptote. **<u>Find the Domain and Range.</u>**

Q.2 (4 pts) Expand the following logarithm, as much as possible: $\log_5\left(\frac{25x^{\frac{1}{3}}}{y}\right)^2$

Q.3 (4 pts) Solve $8e^{6x-5} + 3 = 19$

Q.4 (4 pts) Use the reference angle theorem to find the exact value of $\cot 510°$

Q.5 (6 pts) Given that $\csc\theta = -\dfrac{8}{3}$ and θ lies in Quadrant 3, find the value of each of the remaining trigonometric functions.

Q.6 (4 pts) Find the value of $\tan\left[\sin^{-1}\left(-\dfrac{7}{25}\right)\right]$, **without using a calculator**. Show all your steps.

Q.7 (4 pts) Find the amplitude, period and phase shift of the function $y = -3\sin(2x - \pi)$. **Do not graph the function.**

Q.8 (6 pts) Verify the identity: $\dfrac{\sin x}{1 - \cos x} = \csc x + \cot x$

Q.9 (4 pts) Find the exact value of $\cos 111° \cos 6° + \sin 111° \sin 6°$. Show all your steps.

Q.10 (4 pts) Solve the equation $4\cos^2 x - 3 = 0$ over the interval $[0, 360°)$

Q.11 (5 pts) Given that $A = \begin{bmatrix} 1 & 3 & 4 \\ 1 & 2 & 1 \\ 3 & 4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$. Find $\frac{1}{3}(A^2 + B) - I_3$

Q.12 (3 pts) What type of solution is represented by the reduced matrix? $\begin{bmatrix} 1 & 0 & -1 & | & 1 \\ 0 & 1 & 2 & | & 1 \\ 0 & 0 & 0 & | & 0 \end{bmatrix}$

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

Q.13 (8 pts) Use inverse of the coefficient matrix A^{-1} to solve $\begin{cases} x + y & = 0 \\ 3y - z = -3 \\ x - y + z = 2 \end{cases}$

Q.14 (10 pts) Use Cramer's Rule to find **only** the value of y $\begin{cases} x+y \quad\ =3 \\ \quad 3y-z=5 \\ x-y+z=0 \end{cases}$

Do not find the values of x and z.

Q.15 (6 pts) Evaluate the determinant $\begin{vmatrix} 1 & 2 & 1 & -1 \\ 0 & 3 & 1 & 2 \\ 3 & 0 & 0 & 4 \\ 1 & 0 & 1 & 1 \end{vmatrix}$

Q.16 (6 pts) Find the standard form of the equation of the parabola with its Directrix at $x = 2$ and its focus at $(-6,3)$.

Q.17 (6 pts) Given the hyperbola $\dfrac{(x-2)^2}{16} - \dfrac{(y+1)^2}{9} = 1$. Find the coordinates of the foci and the equations of the asymptotes.

Q.18 (10 pts) Identify and sketch the conic section $4x^2 + 9y^2 + 24x - 18y + 9 = 0$.