



Prince Sultan University
Department of Mathematical Sciences

MATH 002
Final Examination
Semester II, Term 102
Sunday, June 5, 2011
Time Allowed: 150 minutes

Student Name: _____

Student ID #: _____

Section					
Mr. Abid		Dr. Hamdi		Dr. Aiman	Mr. Khaled
8 ---- 9	10 ---- 11	9 ---- 10	11 ---- 12	11 ---- 12	1 ---- 2
211	210	213	237	209	212

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

Problems	Max points	Student's Points
1,2,3	15	
4,5,6,7	16	
8,9,10	13	
11,12	14	
13,14,15	17	
16,17	12	
18,19	13	
Total	100	

Q.1 (3 points) Given $f(x) = -2^{x+1} + 1$, find each of the following.

(a) Range of f

(b) Equation of the horizontal asymptote of f

(c) The y -intercept

Q.2 (4 points) Expand the following logarithmic expression as much as possible,

$$\log \left[\frac{1000x^2(x+2)}{7(x-9)^5} \right]^2$$

Q.3 (8 points) Solve each of the following equations:

(a) $\ln(3x-3) - \ln(x-1) = \ln 4$

(b) $3^{2x} + 3^x - 12 = 0$

Q.4 (4 points) A tower is 200 feet tall. To the nearest degree, find the angle of elevation from a point 50 feet from the base of the tower to the top of the tower.

Q.5 (4 points) If $(-2, 5)$ is a point on the terminal side of angle θ , find the exact value of $5\csc\theta + 2\sec\theta$.

Q.6 (4 points) If $\sin\theta = a$ and $\cos\theta = b$, express the following in terms of a and b .

(a) $\sin(-\theta) + \cos(-\theta)$

(b) $\cot\left(\frac{\pi}{2} - \theta\right) - \sec\theta$.

Q.7 (4 points) Find the period and phase shift of $f(x) = -\cos\left(\frac{2\pi - x}{3}\right)$.

Q.8 (4 points) Write $\sin\left(\cos^{-1}\frac{x}{3}\right)$ as an algebraic expression. Assume that $x > 0$

Q.9 (4 points) Solve the system:
$$\begin{cases} \frac{2x}{3} + \frac{y}{5} = 6 \\ \frac{x}{6} - \frac{y}{2} = -4 \end{cases}$$

Q.10 (5 points) Graph the solution set of the following system of inequalities:

$$\begin{cases} y \leq 1 - x^2 \\ x^2 + y^2 < 4 \end{cases}$$

Q.11 (7 points) Use Gaussian elimination to find the solution set of the system.

$$\begin{cases} 2x + 3y - 17z = 10 \\ x - 2y + 2z = -2 \end{cases}$$

Q.12 (7 points) Given that $B = \begin{bmatrix} 8 & 8 \\ 20 & 24 \end{bmatrix}$ and $C = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix}$, solve the following matrix equation for X : $3X - 2C^{-1} = \frac{1}{4}B + 3I_2$

Q.13 (5 points) Find the value of x in the following equation: $\begin{vmatrix} 1 & x & -2 \\ 3 & 1 & 1 \\ 0 & -2 & 2 \end{vmatrix} + 8x = 2$

Q.14 (6 points) Find the standard form of the equation of the ellipse with foci: $(2, -4)$, $(2, 6)$ and major axis of length 16.

Q.15 (6 points) Graph $\frac{1}{16}(y+2)^2 = 2x-10$. Show the main features of the graph.
(Show all your steps)

Q.16 (7 points) Give the coordinates of the foci and the equations of the asymptotes of the hyperbola: $4x^2 - 25y^2 - 32x + 164 = 0$.

Q.17 (5 points) Use Cramer's Rule to **find the value of z:**
$$\begin{cases} 3x + y - 2z = -3 \\ 2x + 7y + 3z = 9 \\ 4x - 3y - z = 7 \end{cases}$$

Q.18 (5 points) The formula $C(t) = 100 + 25e^{0.3t}$ models the average cost of a house, in thousands of dollars, t years after 2000. When (what year) will a house cost 183 thousand dollars?

Q.19 (8 points) Use A^{-1} (the inverse of the coefficient matrix) to solve the system.

$$\begin{cases} 2x + 3y + 8z = 3 \\ x + 2y + 5z = 1 \\ -x + y + 2z = -3 \end{cases}$$