Prince Sultan University
Orientation Mathematics Program

MATH 002
Final Examination
Semester II, Term 092
Tuesday, June 15, 2010
Time Allowed: 150 minutes

Student Name: _____

Student ID #: _____ Section #: _____

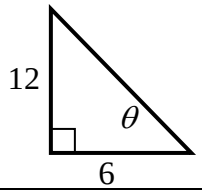
Teacher's Name: _____

Important Instructions:

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. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 17 problems, some with several parts. Make sure your paper has all these problems.

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

Q.1 (15 points) Write **only the final answer** for each part

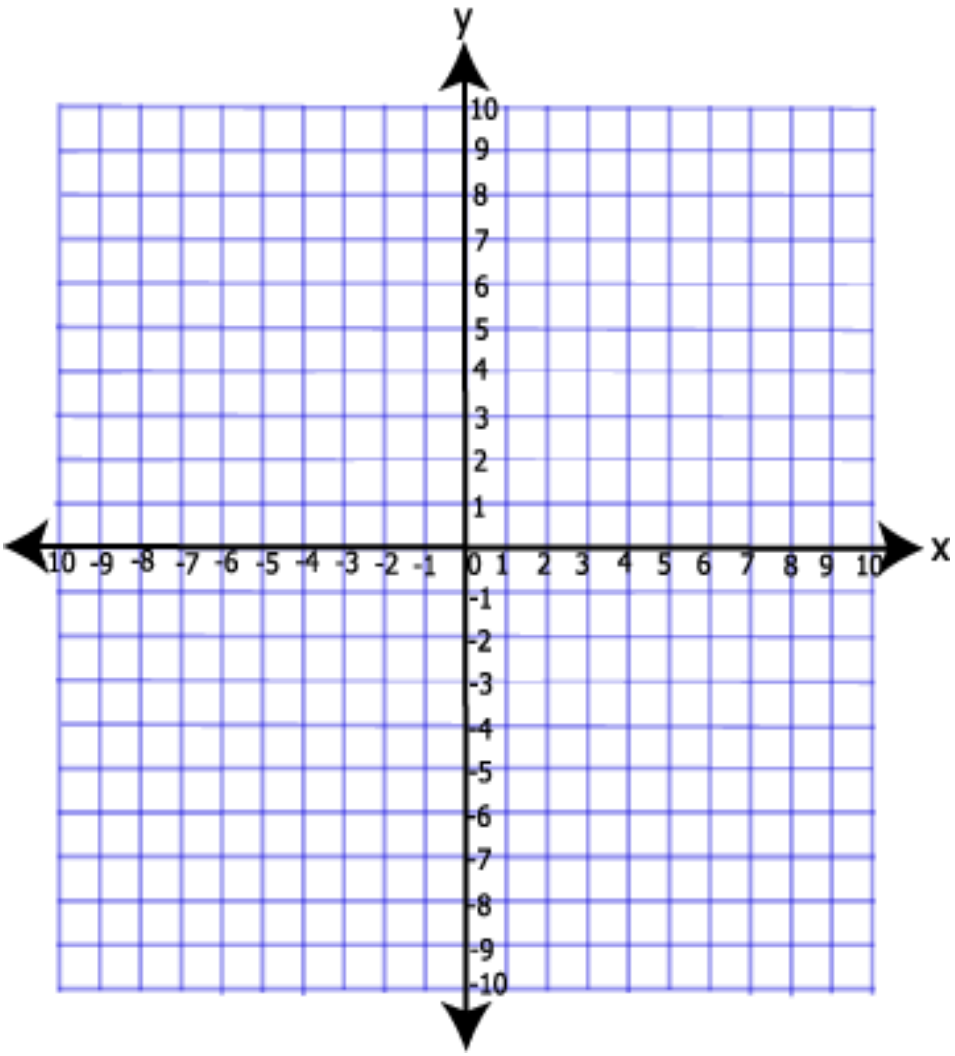
#	Questions	Answers
1	Find the Domain of the logarithmic function: $f(x) = \log_2(x-3)$	
2	Evaluate $\log_3 \sqrt{27} + \log 0.001$	
3	Write the equation in its equivalent logarithmic form: $\sqrt[4]{81} = 3$	
4	Evaluate $x^{\log_x(y^3)}$	
5	Use properties of logarithms to expand $\log_4\left(\sqrt{xy}\right)$	
6	Solve the equation: $\log_3(x-1) = 2$	
7	Write the expression as the sine or cosine of an angle, then find the exact value: $\sin 40^\circ \cos 20^\circ + \cos 40^\circ \sin 20^\circ$	
8	Find a cofunction with the same value as $\tan\frac{\pi}{9}$	
9	Convert the angle $\frac{7\pi}{5}$ to degrees	
10	Find the value of the angle θ in the shown triangle to the nearest degree. 	
11	Use a calculator to find the value of of acute angle θ to nearest degree if: $\cos\theta = 0.8771$	
12	Let $\sin\theta = \frac{-2}{5}$ and $\cos\theta < 0$. Find which quadrant θ lies in.	
13	Find the determinant for $A = \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix}$	
14	Perform the indicated matrix row operation. Write the new matrix. $\begin{bmatrix} 1 & -1 & 5 & -6 \\ 3 & 3 & -1 & 10 \\ 1 & 3 & 2 & 5 \end{bmatrix} \xrightarrow{-3R_1 + R_2}$	
15	Find the reference angle for $\theta = 580^\circ$	

Show all steps for each question

Q.2 (5 points) Solve the exponential equation: $e^{2x} + e^{x} - 6 = 0$

Q.3 (5 points) (i) Sketch the graph of $f(x) = 2^{x-1} + 3$

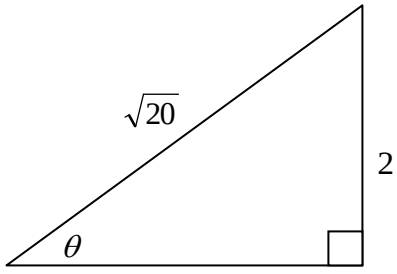
(ii) Give the domain and range of $f(x)$



Q.4 (4 points) Use a sketch to find the **exact value** of: $\sec(\sin^{-1}\frac{x}{2})$, $0 < x < 2$

Q.5 (4 points) Solve the trigonometric equation $\sin^2 x + 2\cos x = 1$, $0 \le x < 360^\circ$

Q.6 (4 points) Find the **exact values** for the six trigonometric functions of angle θ without using the calculator.



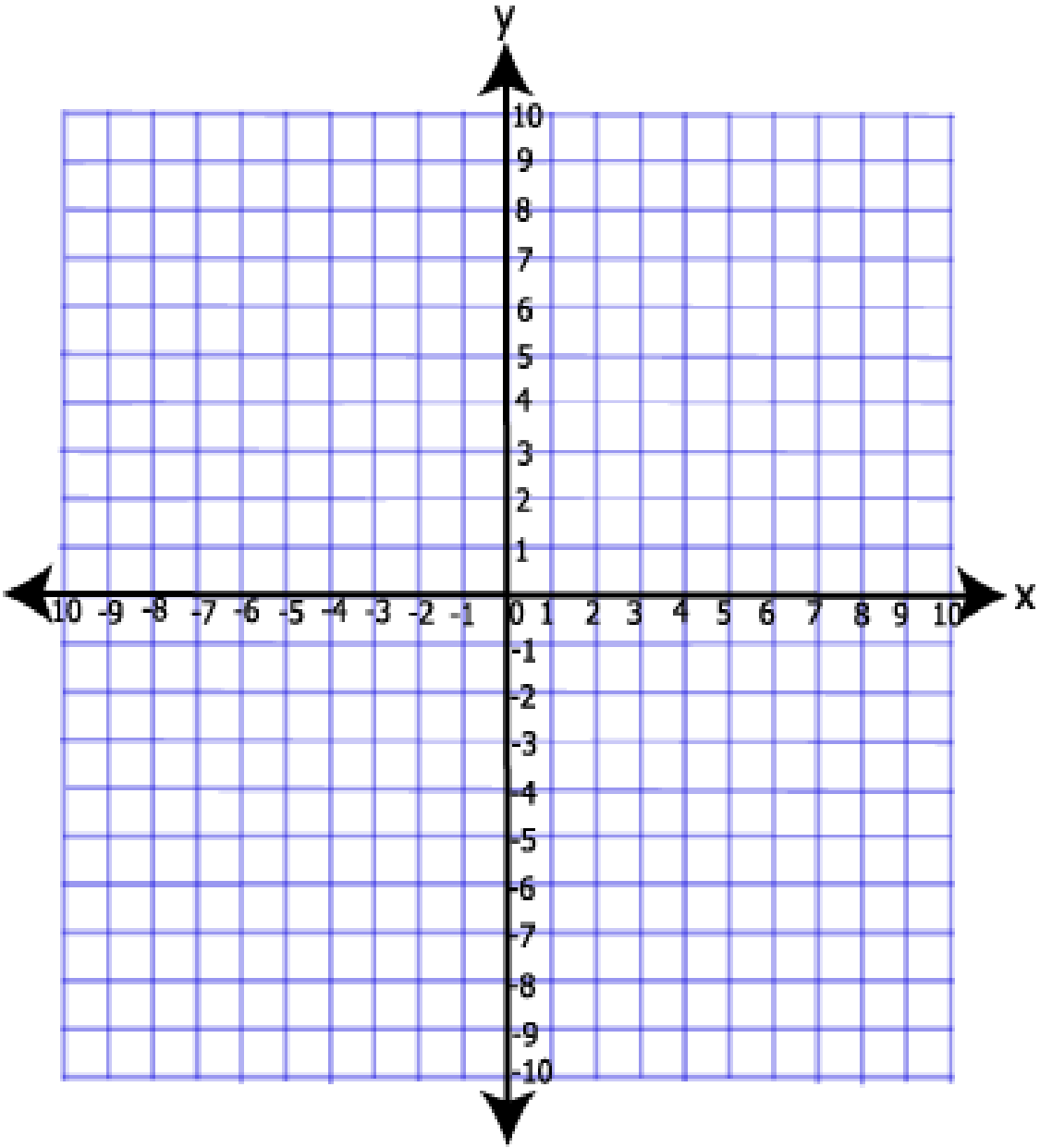
Q.7 (6 points) Graph the solution set of the system of inequalities.

$x + y \le 7$

$x^2 + y^2 < 49$

$x \ge -5$

$y \ge -3$



Q.8 (4 points) Find $a, b, c,$ and d so that $\begin{bmatrix} 4 & -2 \\ -3 & 0 \end{bmatrix} - \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 2 & -3 \\ 0 & 5 \end{bmatrix}$

Q.9 (6 points) Solve the following system of equations using matrices. Use Gaussian Elimination with back substitution.

$$x + y + 4z = 2$$
$$2x + 3y + 6z = 0$$
$$-x - y + 2z = -14$$

Q.10 (5 points) Let $A = \begin{bmatrix} 0 & -2 & 7 \\ 5 & 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 1 \\ -1 & 5 \\ 6 & 0 \end{bmatrix}$, and $C = \begin{bmatrix} 2 & -6 \\ 4 & -8 \end{bmatrix}$

a. Find $2A + 3B$

b. Find $AB - C$

Q.11 (6 points) Use Cramer's rule to solve the system:

$$\begin{aligned} x + 2y - 3z &= 1 \\ 3y - 4z &= 0 \\ 3x \quad - 2z &= 0 \end{aligned}$$

Q.12 (4 points) Evaluate the determinant $\begin{vmatrix} -5 & 3 & -4 & 0 \\ -1 & -1 & 0 & 0 \\ -1 & 6 & -3 & -2 \\ 1 & 7 & 0 & 0 \end{vmatrix}$

Q.13 (7 points) Use the inverse of the coefficient matrix to solve the linear system.

$$2x + 2y - z = 5$$
$$3y - z = 2$$
$$-x - 2y + z = -3$$

Q.14 (6 points) (i) Find an equation of the hyperbola satisfying the following conditions:

Center : $(4, -2)$; Focus: $(7, -2)$; vertex: $(6, -2)$

(ii) Find the equations of the asymptotes

Q.15 (5 points) Find the standard form of the equation of the ellipse satisfying the given conditions: Endpoints of the major axis: $(7,10)$ and $(7,2)$

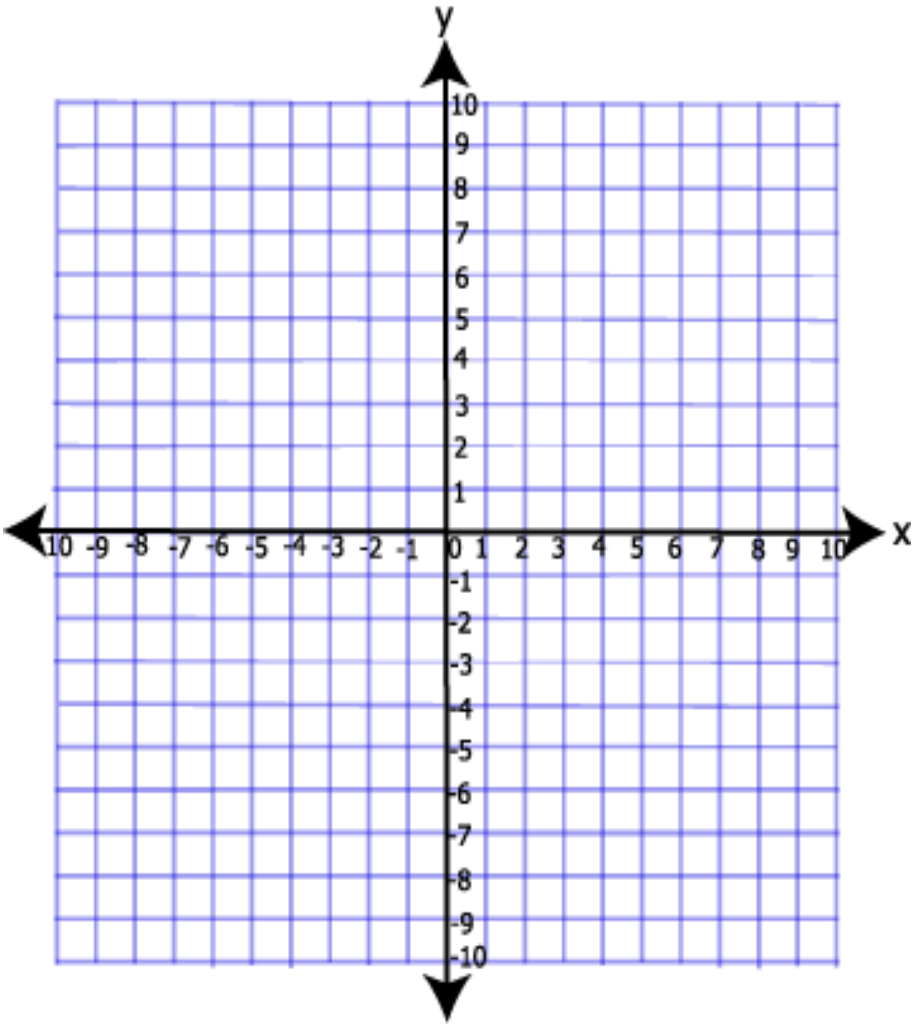
Endpoints of the minor axis: $(5,6)$ and $(9,6)$

Q.16 (7 points) Consider the following conic section.

$$8(x-3)^2 - 2(y+2)^2 = 32$$

(i) Identify the equation as parabola, hyperbola, or ellipse._____

(ii) Graph the conic section and locate its center, vertices, and the foci.



Q.17 (7 points) graph the conic section: $y^2 - 2y + 12x - 35 = 0$ and locate its focus, vertex, and directrix.