Prince Sultan University
Orientation Mathematics Program
MATH 002
Midterm Examination

Semester I, Term 081
Monday, December 01, 2008
Time Allowed: 100 minutes

Student Name: _____

Student ID number: _____ 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. If your mobile phone is heard, your exam will be cancelled 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, some with several parts. Make sure your paper has all these problems.

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

1. (5 points) Graph $f(x) = 2^{-x} + 3$ by making a table of coordinates. Determine the domain and range of f.

2. (4 points) Use properties of logarithms to condense the following logarithmic expression: $\frac{1}{3}\left[5\ln(x+6) - \ln(x) + \ln(x^2 - 25)\right]$.

3. (4 points) Solve $\log_2(x+2) + \log_2 x = 3$.

4. (4 points) Solve $5^{2x+3} = \left(\frac{1}{25}\right)^{x-1}$.

5. (5 points) Find the length of the arc on a circle of radius 20 feet intercepted by 75° central angle. Express arc length in terms of π, then round your answer to two decimal places.

6. (4 points) The formula $C(t) = 20555 + 5290 \ln t$ models the average cost of a new car, where t is the number of years after 1999. When will the average cost of a new car reach $35000?

7. (6 points) Use reference angles (not calculator) to find the exact value of

a) $\sin 345^\circ$.

b) $\cos\frac{17\pi}{6}$.

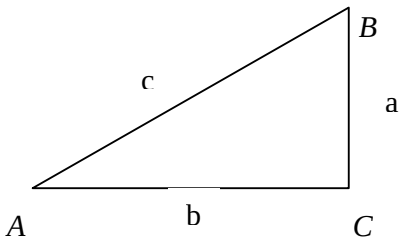
8. (3 points) Find the domain of the logarithmic function: $f(x) = \log(2 - x)$.

9. (8 points) Determine the amplitude, period and phase shift of $y = -3\sin(2x - \pi)$. Then graph one period of the function. Show all key points.

10. (5 points) Find the exact value of each of the remaining trigonometric functions of θ if $\cos\theta = -\frac{3}{5}$ and θ is in quadrant 3.

11. (4 points) Use a sketch to find the exact value of $\tan\left[\cos^{-1}\left(-\frac{1}{3}\right)\right]$.

12. (5 points) Solve the right triangle with $A = 21^\circ$ and $c = 13m$. Give your answer to three decimal places.



13. (5 points) Suppose that $\sec\alpha = 2$, α lies in quadrant 4 and $\cos\beta = -\frac{1}{3}$, β lies in quadrant 3. Find the exact value of $\sin(\alpha - \beta)$.

14.(5 points) The angle of elevation of a building is 37° from a point on the ground 30 yards from its base. Find the height of the building to the nearest yard.

15. (3 points) Find the value of rounded to two decimal places

a) $\sin^{-1}(0.47)$

b) $\csc\left(\frac{\pi}{9}\right)$

16. (15 points) Verify each identity.

(a) $1-\dfrac{\sin^2 x}{1+\cos x}=\cos x$

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

(c) $\sin\left(x+\dfrac{3\pi}{2}\right)=-\cos x$

17. (15 points) Solve each equation

(a) $\cos 4x = -\frac{\sqrt{3}}{2}$ on the interval $[0, 2\pi)$.

(b) $\sin x + 2\sin x \cos x = 0.$

(c) $\sin^2 x - 2\cos x - 2 = 0$ on the interval $[0, 2\pi)$.