Prince Sultan University
Orientation Mathematics Program
MATH 002
Midterm Examination
Term: 062
Sunday, April 1, 2007
Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____ Section #: _____

Teacher's Name: _____

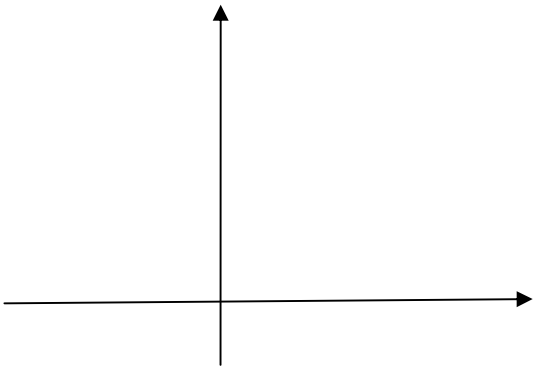
Important Instructions:

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

Problems	Max points	Student's Points
1,2,3,4	20	
5,6,7	21	
8,9	20	
10,11,12,13	20	
14,15,16	19	
Total	100	

Provide an organized complete solution for each Question.

Q1. (4 points) Graph the function $g(x) = \frac{1}{3}\, 3^x$ in the rectangular coordinate system. Plot at least 3 points.



Q2. (7 points) Approximate each expression using a calculator. (Round your answer to three decimal places)

a. $4^e =$

b. $e^{-\sqrt{5}} =$

c. $\log_6(93) =$

d. $\ln(\sqrt[3]{9}) =$

e. $\sec 55^{\circ} =$

f. $\csc 2 =$

g. $\cot\dfrac{\pi}{11} =$

Q3. (5 points) The formula $A = 15.9\, e^{0.0235\, t}$ models the population of Florida, A, in millions, t years after 2000. When the population of Florida reach 19.2 million?

Q4. (4 points) Find the domain of $f(x) = \log_3(x^2)$

Q5. (5 points) Find the measure of the central angle in **degrees** of a circle of radius $r = 10$ inches that intercepts an arc of length $s = 40$ inches.

Q6. (6 points) Solve the exponential equation: $3^{2x} + 3^{x} - 2 = 0$

Q7. (10 points) Expand each logarithmic expression as much as possible

a. $\ln\left[\dfrac{x^{4}\ \sqrt{x^{6}+7}}{e\ (x+3)^{2}}\right]$

b. $\log_{5}\sqrt[3]{\dfrac{x^{2}y}{125}}$

Q8. (8 points) Use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1.

a. $2\log_b x - 7\log_b z + 5\log_b y$

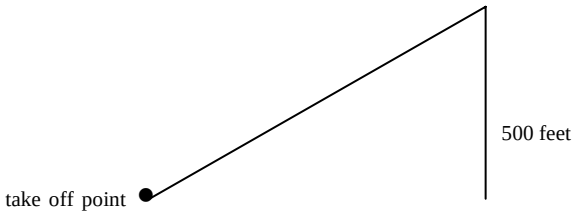
b. $\frac{1}{3}\left[6\ln(w+3) + 3\ln(x^2-9) - \ln 8 - \ln(z-3)^3\right]$

Q9. (12 points) Solve each logarithmic equation and check your answers. Then use a calculator to find the answer correct to three decimal places.

a. $\log_2(x-3) + \log_2 x - \log_2(x+2) = 2$

b. $\ln\sqrt{x+4} = 2$

Q10. (6 points) A plane rises from take-off and flies at an angle of 10^{O} with the horizontal runway. When it was 500 feet height, find the distance between the plane and the take-off point, to the nearest foot, the plane has flown.



Q11. (5 points) If $\tan\theta = \frac{4}{3}$ and $\cos\theta < 0$, find the **exact** value of the remaining trigonometric functions of θ.

Q12. (6 points) Find the **exact** value of the following. (**Do not use a calculator**):

a. $\sin(\frac{-17\pi}{3})$

b. $\sec 495^{\circ}$

c. $\cot(\frac{13\pi}{3})$

Q13. (3 points) Use a calculator to find the value of the acute angle θ in **radians**, of $\tan\theta = 0.5117$, rounded to three decimal places.

Q14. (6 points) Use a right triangle to write the expression as an algebraic expression. Assume that x is positive and in the domain of the given inverse trigonometric function

$$\cot[\tan^{-1}(\tfrac{x}{\sqrt{3}})]$$

Q15. (5 points) Use a sketch to find the **exact** value of: $\csc\left[\cos^{-1}(\tfrac{-\sqrt{3}}{2})\right]$

Q16. (8 points) Determine the period and the phase shift. Then graph one period of

$$y = -3\sin(2\pi x) + 2$$