Prince Sultan University
Orientation Mathematics Program
MATH 002
Midterm Examination
Semester I, Term: 071
Wednesday, October 31, 2007
Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____ Section #: _____

Teacher's Name: _____

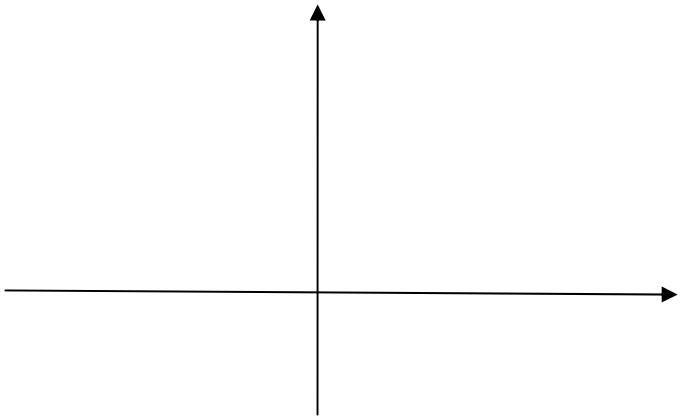
Important Instructions:

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. Provide an organized complete solution for each Question.
8. This examination has 15 problems. Make sure your paper has all these problems.

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

Note: Provide an organized complete solution for each Question.

Q1. (5 points) Graph the function $g(x) = \frac{1}{2}\, 2^{x} + 1$ in the rectangular coordinate system. Plot at least three points.



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

a. $21(3.5)^{-e}$ =

b. $3e^{\sqrt{3}}$ =

c. $\log_{0.5}(88)$ =

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

e. $\csc(43.7)^{\mathrm{O}}$ =

f. $\sec 4.9$ =

g. $(\tan\frac{\pi}{4})(\tan\frac{\pi}{9})$ =

Q3. (5 points) Find the length of the arc on a circle of radius $r = 10$ **inches** intercepted by a central angle $\theta = 225^{\mathrm{O}}$. (Round your answer to three decimal places).

Q4. (5 points) The number of words per minute a student can type will increase with practice and can be approximated by the equation $N = 100\left[1-(0.7)^{t}\right]$ where N is the number of words typed per minute after (t) days of instruction. In how many days will the student be able to type 92 words per a minute?

Q5. (10 points) Expand each logarithmic expression as much as possible

a. $\log_5\left[\dfrac{e^{7}\ \sqrt{x^{2}+3}}{x^{e}\ (x+2)^{8}}\right]$

b. $\log_c \sqrt[8]{\dfrac{x^{3}+y}{128}}$

Q6. (4 points) Use properties of logarithms to condense the following logarithmic expression. Write the expression as a single logarithm whose coefficient is 1.

$$2\log_7(x-10) - 9\log_7 z^{\frac{1}{3}} - 4\log_7 y^{\frac{1}{16}}$$

Q7. (14 points) Solve each logarithmic equation and check your answers. Then use a calculator to find the answer correct to three decimal places.

a. $5^{2-x} = \frac{1}{125}$

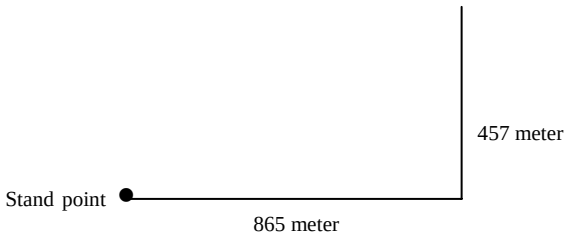
b. $3^{\frac{x}{7}} = 0.2$

c. $e^{4x} + 5e^{2x} - 24 = 0$

d. $3\log_2(x-1) = 5 - \log_2 4$

Q8. (6 points) Given $\sin\theta = \frac{2}{3}$ and $\cos\theta = \frac{\sqrt{5}}{3}$, find the value of each of the four remaining trigonometric functions.

Q9. (6 points) The KLCC building is 457 meter high. If you stand 865 meter from the base of the building and look to the top, find the angle of elevation to the nearest degree.



Q10. (5 points) If $\sec\theta = -3$ and $\tan\theta > 0$, find the **exact** value of the remaining trigonometric functions of θ.

Q11. (12 points) Find the reference angle and use it to find the **exact** value of the following. (**Do not use a calculator**):

a. $\sin(\frac{-35\pi}{6})$

b. $\cos(\frac{3\pi}{4})$

c. $\sec 495^\circ$

d. $\csc 4.7$

e. $\tan(-240^\circ)$

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

Q12. (3 points) Use a calculator to find the value of the acute angle θ in **radians**, of $\cos\theta = 0.8771$, rounded to three decimal places.

Q13. (4 points) Find the domain of $f(x) = \log_4(81 - x^2)$

Q14. (5 points) The terminal side of an angle θ passes through $(-1,-5)$. Find the **exact** value of each of the six trigonometric functions of θ.

Q15. (9 points) Determine the amplitude, period and the phase shift. Then graph one period of $y = 2\cos(2\pi x + 4\pi)$. Plot at least five points.