PRINCE SULTAN UNIVERSITY

Department of Mathematical Sciences

MATH 002 First Examination

Tuesday, 19 October 2004
(041)

Time allowed: 90 minutes

Student Name: _____

Student ID number: _____

Section: _____

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 12 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3,4	25	
5,6,7	26	
8,9,10	28	
11,12	21	
Total	100	

1. (9 points) Graph $f(x)=\left(\frac{1}{2}\right)^{x-1}+1$. Plot at least 3 points. Give the range of f .

2. (4 points) Find the domain of $f(x)=\log(2-3x)$.

3. (4 points) Write the equation $3=\log_b 27$ in its equivalent exponential form.

4. (8 points) Write $\frac{1}{3}\left[5\ln(x+6)-\ln x-\ln\left(x^2-25\right)\right]$ as a single logarithm.

5. (10 points) Solve $e^{4x}+5e^{2x}-24=0$. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

6. (8 points) The function $f(x)=15557+5259\ln x$ models the average cost of a new car, $f(x)$, in dollars, x years after 1989. When was the average cost of a new car \$25000?

7. (8 points) The radius of a wheel is 80 centimeters. If the wheel rotates through an angle of 60°, how many centimeters does it move? Round your answer to two decimal places.

8. (12 points) Let θ be an acute angle, $\sin\theta = \frac{1}{3}$, and $\cos\theta = \frac{2\sqrt{2}}{3}$. Use identities to find the **exact** values of $\tan\theta, \csc\theta, \sec\theta, and\ \cot\theta$. Where necessary, rationalize denominators.

9. (7 points) A road is inclined at an angle of 5°. After driving 5000 feet along this road, find the driver's increase in altitude. Round to the nearest foot.

10. (9 points) Find the reference angle for each of the following angles.

(i) -250°

(ii) $\frac{11\pi}{7}$

(iii) 4.7

11. (9 points) Find the **exact** value of $\cos 570^\circ + \sec\frac{9\pi}{4}$.

12. (12 points) Determine the amplitude, period, and phase shift of $y = -4\sin\left(2x - \frac{2\pi}{3}\right)$. Then graph one period of the function. Show the coordinates of the key points on the graph.