PRINCE SULTAN UNIVERSITY

Department of Mathematical Sciences

MATH 002 Midterm Examination

Saturday, 16 April 2005

(042)

Time allowed: 120 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 14 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2	18	
3,4,5	18	
6,7,8	18	
9,10,11	22	
12,13,14	24	
Total	100	

1. (10 points) Approximate each expression using a calculator. Round your answer to three decimal places.

   (a) $3^{\sqrt{5}}$

   (b) $e^{-0.95}$

   (c) $\log_8(13.7)$

   (d) $\sin 31.3$

   (e) $\tan^{-1}\left(-\sqrt{5061}\right)$

2. (8 points) Graph $f(x)=\left(\frac{1}{4}\right)^x$ and $g(x)=\log_{1/4} x$ in the same rectangular coordinate system.

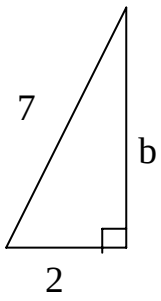
3. (6 points) Expand $\log_5 \sqrt[3]{\frac{x^2 y}{25}}$ as much as possible.

4. (6 points) Solve $3\log_2(x-1) = 5 - \log_2 4$.

5. (6 points) The function $f(x) = 68.41 + 1.75 \ln x$ models the life expectancy, $f(x)$, in years, for African females born x years after 1969. In which birth year was life expectancy 73.7 years? Round to the nearest year.

6. (6 points) If $\csc\theta = -4$ and $\tan\theta > 0,$ find the **exact** values of the remaining trigonometric functions of θ.

7. (6 points) Solve the right triangle shown below. Round length to two decimal places and express angles to the nearest tenth of a degree.



8. (6 points) Use a right triangle to write $\sin\left(\tan^{-1} 2x\right)$ as an algebraic expression. Assume that x is positive and in the domain of the given inverse trigonometric function.

9. (8 points) Find the **exact** value of each expression.

(i) $\cot\left(-240^\circ\right)$

(ii) $\sin\frac{101\pi}{4}$

10. (6 points) A telephone pole is 55 feet tall. A guy wire 80 feet long is attached from the ground to the top of the pole. Find the angle between the wire and the pole to the nearest degree.

11. (8 points) Determine the amplitude, period, and phase shift of $y = \cos\left(2x + \pi\right)$. Then graph one period of the function. Show the coordinates of the key points on the graph.

12. (8 points) Verify each identity.

(i) $\sin^2 x\left(1+\cot^2 x\right)=1$

(ii) $\dfrac{\sin t}{\csc t}+\dfrac{\cos t}{\sec t}=1$

13. (8 points) Find the **exact** value of $\cos 195^\circ$.

14. (8 points) Solve the equation $\sin x-\cos x=1,\ 0\le x<2\pi$.