PRINCE SULTAN UNIVERSITY

Department of Mathematical Sciences

MATH 002 Midterm Examination

December 08, 2009 (091)

Time allowed: 90 minutes

Student Name: _____

Student ID number: _____

Section: _____ Instructor Name: _____

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

Problems	Max points	Student's Points
1,2,3,4,5	22	
6,7,8	14	
9,10,11	16	
12,13,14	17	
15,16	14	
17, 18, 19	17	
Total	100	

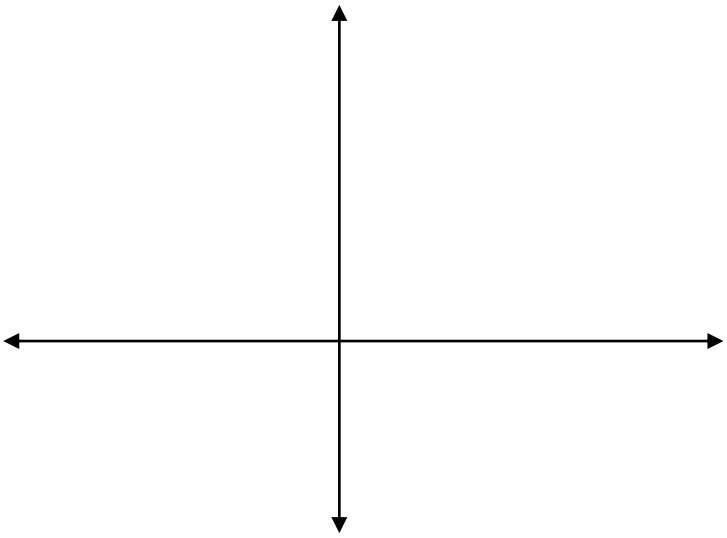
1. (3 points) Approximate using a calculator. Round your answer to three decimal places.

   (a) $e^{-0.68}$

   (b) $\log_{0.9} 20.3$

   (c) $\csc 9$

2. (6 points) Graph $f(x) = e^x - 2$. Plot at least three points. Determine the domain and the range.



3. (4 points) Expand $\log_2 \sqrt[7]{\frac{x^2 y}{4}}$ as much as possible. (Evaluate where possible).

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

5. (5 points) Solve $\ln(x-2) - \ln(x+3) = \ln(x-1) - \ln(x+7)$

6. (6 points) The formula $A = 20.1e^{0.0927t}$ models the population of an Arab country, *A*, in millions, *t* years after 2008. When will the population of the country reach 29.4 million?

7. (4 points) Students took a Math exam in monthly intervals to see how much of the course content they remember over time. The average score for the group, $f(t)$, after t months was modeled by the function $f(t) = 79 - 13\ln(t+1)$.
What was the average score after 4 months?

8. (4 points) A plane rises from take-off and flies at an angle of 6° with the horizontal runway. When its height is 950 feet, find the distance, to the nearest foot, the plane has flown.

9. (6 points) Use reference angles and a sketch to find the exact value of the following.

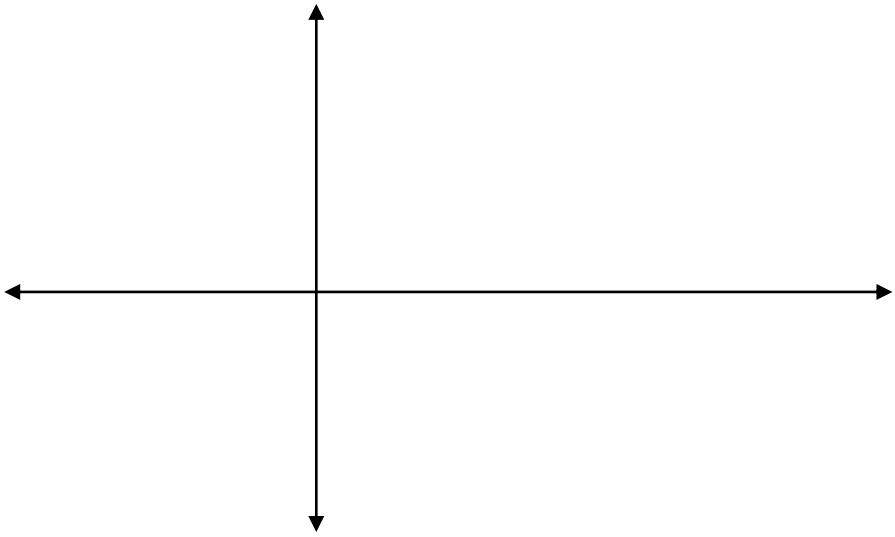
   (a) $\cot\dfrac{-16\pi}{3}$

   (b) $\sin(570^\circ)$

10. (4 points) Find the length of the arc on a circle of radius 7 inches intercepted by a central angle $\theta = 150^\circ$. Express arc length in terms of π. then round your answer to two decimal places.

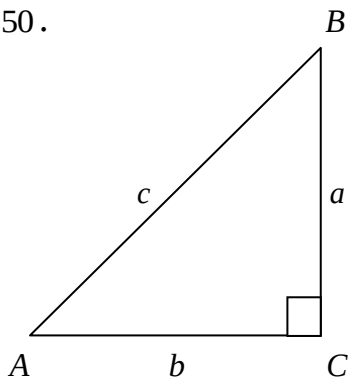
11. (6 points) If $\tan\theta = -\sqrt{15}$ and $\cos\theta < 0$, find the exact value of each of the remaining trigonometric functions of θ.

12. (7 points) Graph one period of $y = 3\cos\left(2x - \frac{\pi}{2}\right) - 1$



13. (5 points) Use a sketch to find the exact value of $\tan\left[\sin^{-1}\left(\frac{-5}{13}\right)\right]$.

14. (5 points) Solve the right triangle with $A = 54.4^\circ$ and $c = 50$.



15. (6 points) The point $P\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$ on the unit circle is corresponding to a real number *t*. Find the values of the six trigonometric functions at *t*.

16. (8 points) Verify each identity

(a) $\sec x - \sec x \sin^2 x = \cos x$

(b) $\cot t + \frac{\sin t}{1+\cos t} = \csc t$

17. (5 points) Use the sum or difference formula to find the exact value of $\cos\left(135^\circ + 30^\circ\right)$.

18. (6 points) Solve $\tan 3x = -\sqrt{3}$ on the interval $\left[0, 360^\circ\right)$.

19. (6 points) Solve $\cos x - 2\sin x \cos x = 0$ on the interval $\left[0, 360^\circ\right)$.