HOMEWORK 7 - MATH 140
DUE DATE: Monday, October 24
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Solve the following equations:

   (a) $3\log_2 x = -\log_2 27$

   (b) $\log_4 x + \log_4 (x-3) = 1$

   (c) $\log_2 (3x+2) - \log_4 x = 3$

2. Solve the following equations:

$$(a)\ 3^{2x} + 3^x - 2 = 0 \quad (b)\ 3^x = 14 \quad (c)\ (\frac{4}{3})^{1-x} = 5^x \quad (d)\ \frac{e^x + e^{-x}}{2} = 3$$

3. Convert from degrees to radians and vice-versa, as appropriate:

$$(a)\ 330° \quad (b)\ -\frac{2\pi}{3} \quad (c)\ 270° \quad (d)\ \frac{5\pi}{12}$$

4. If s denotes length of arc of a circle, r the radius of the circle, θ the central angle and A the area of the sector of the sector corresponding to the central angle θ and the arc length s, find the quantity asked:

   (a) $r = 6$ feet, $\theta = 2$ radians, $s =$?

   (b) $\theta = \frac{1}{4}$ radians, $s = 6$ centimeters, $r =$?

   (c) $r = 6$ feet, $\theta = 2$ radians, $A =$?

   (d) $r = 6$ meters, $A = 8$ square meters, $\theta =$?

5. A spin balancer rotates the wheel of a car at 480 revolutions per minute. If the diameter of the wheel is 26 inches, what road speed is being tested? At how many revolutions per minute should the balancer be set to test a road speed of 80 miles per hour?

6. Find the exact values of the following trigonometric expressions without using your calculator:

   (a) $\cos(7\pi)$

   (b) $\csc(\frac{11\pi}{2})$

   (c) $\tan 45° \cos 30°$

   (d) $2\sin\frac{\pi}{4} + 3\tan\frac{\pi}{4}$

7. Given the point on the terminal side of an angle θ, find the values of $\sin\theta$ and $\cos\theta$:

$$(a)\ (5,-12) \quad (b)\ (-3,2) \quad (c)\ (\frac{1}{3}, \frac{1}{4})$$

8. Find the value of the following expressions without using a calculator:

$$(a)\ \cos 420° \quad (b)\ \sec 540° \quad (c)\ \sin\frac{9\pi}{4} \quad (d)\ \sec\frac{25\pi}{6}$$