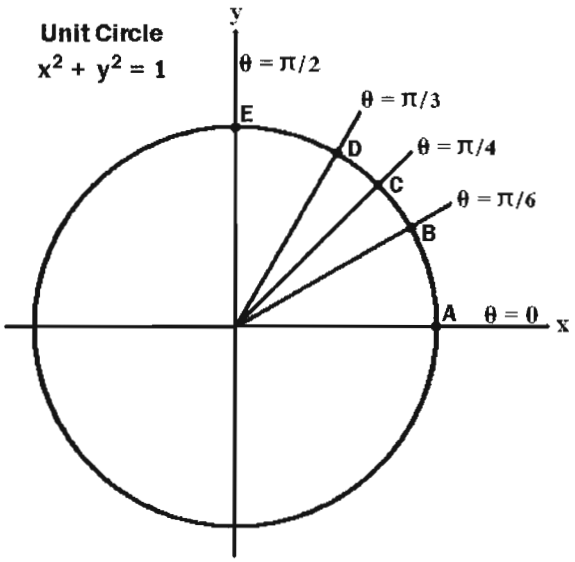
Trigonometry Preliminaries for Calculus

Certain topics from Trigonometry often plague students in Calculus. A review of these topics has been prepared and may be of value to you. Please try the following problems and compare your answers to those given. Then attend a review session at which a math instructor will discuss the solutions and stay to answer student questions. The schedule and location of the review session will be posted.

Unless told otherwise, do not use a calculator or refer to notes.

1. **Write the (x,y) coordinates of each point A,B,C,D,E on the unit circle. Give exact values, using radicals as necessary.**



2. **Give the exact value of the sine, cosine, tangent, and secant of each of the following:**

   a) $5\pi/6$ b) $5\pi/4$ c) $5\pi/3$ d) $5\pi/2$ e) 5π

3. **Write each of the following as a function of x:**

   a) $\sin(\cos^{-1}x)$ b) $\tan(\sin^{-1}x)$ c) $\cos(\tan^{-1}x)$

4. **Verify the identity:** $\sec x = \sqrt{\tan^2 x + 1}$

5. **Find all exact solutions with** $0 \le x < 2\pi$ **for each of the following:**

   a) $\sqrt{3} - 2\sin x = 0$

   b) $\sin 2x - \sin x = 0$

   c) $\cos^2 x - \sin^2 x = 0$

   d) $\sin 2x = 0$

6. **Use a scientific calculator to find all solutions with** $0 \le x < 2\pi$ **for each of the following. Give answers correct to the nearest thousandth.**

   a) $\sin^2 x = 0.4$

   b) $\cos 2x = -0.6$

   c) $\tan x = 3\sin x$

Answers

1. A (1,0)
   B $(\sqrt{3}/2, 1/2)$
   C $(\sqrt{2}/2, \sqrt{2}/2)$
   D $(1/2, \sqrt{3}/2)$
   E (0,1)

2.

	x	sin x	cos x	tan x	sec x
a)	$5\pi/6$	$1/2$	$-\sqrt{3}/2$	$-\sqrt{3}/3$	$-2\sqrt{3}/3$
b)	$5\pi/4$	$-\sqrt{2}/2$	$-\sqrt{2}/2$	1	$-\sqrt{2}$
c)	$5\pi/3$	$-\sqrt{3}/2$	$1/2$	$-\sqrt{3}$	2
d)	$5\pi/2$	1	0	undef.	undef.
e)	5π	0	-1	0	-1

3. a) $\sin(\cos^{-1}x) = \sqrt{1 - x^2}$

   b) $\tan(\sin^{-1}x) = \dfrac{x}{\sqrt{1 - x^2}}$

   c) $\cos(\tan^{-1}x) = \dfrac{1}{\sqrt{1 + x^2}}$

4. $$\sqrt{\tan^2 x + 1} = \sqrt{\frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x}} = \sqrt{\frac{\sin^2 x + \cos^2 x}{\cos^2 x}} = \sqrt{\frac{1}{\cos^2 x}} = \frac{1}{\cos x} = \sec x$$

   $$\text{so} \quad \sqrt{\tan^2 x + 1} = \sec x$$

5. a) $\{ \pi/3, 2\pi/3 \}$
   b) $\{ 0, \pi/3, \pi, 5\pi/3 \}$
   c) $\{ \pi/4, 3\pi/4, 5\pi/4, 7\pi/4 \}$
   d) $\{ 0, \pi/2, \pi, 3\pi/2 \}$

6. a) { 0.685, 2.457, 3.826, 5.598 }
   b) { 1.107, 2.034, 4.249, 5.176 }
   c) { 0, 1.231, 3.142, 5.052 }