Trigonometry Test 4 Practice, Chapter 4

1. Find the exact value of $sin(2x), cos(2x), tan(2x), sin\frac{x}{2}, cos\frac{x}{2}, tan\frac{x}{2}$.

    a) $secx = 5 \ with \ \frac{3\pi}{2} < x < 2\pi$ b) $cotx$ = -5 with x in Quadrant II

2. Find the exact value of sin, cos and tan for the given angles:
    a)   105°   b)   -75°   c)   345°

3. Use the fundamental identities to find the exact values of the remaining trigonometric functions of x.

    a) $cosx = \frac{-4}{9} \ and \ sinx > 0$ b) $secx = \frac{-61}{60} \ and \ tanx > 0$

4. Find the __exact__ values for the sin(x + y), cos(x + y), tan(x + y), sin(x – y), cos(x – y), tan(x – y), and state which quadrant x + y and x – y is in, given the following conditions:

    a) $sinx = \frac{2}{3}, cosy = \frac{-1}{4}$, x in quadrant II, and y in quadrant III

    b) $cosx = \frac{-1}{3}, tany = \frac{1}{2}$, x in quadrant II, and y in quadrant III

    c) $tanx = \frac{3}{4}, tany = \frac{-1}{2}$, x in quadrant III, and y in quadrant IV

5. Use a graphing calculator to test whether the following is an identity. If it is an identity, verify it. If it is not an identity, find a value of x for which both sides are defined but not equal.

    a) $\frac{\cos(-x)}{sinxcot(-x)} = 1$ b) $\frac{tanx}{sinx+2tanx} = \frac{1}{cosx-2}$

    c) $\frac{cosx}{1-sinx} + \frac{cosx}{1+sinx} = 2secx$

6. Verify the following identities. You will have options of identities to verify.

    a) $\sin^2x - \sin^2y = \cos^2y - \cos^2x$ b) $2\cos^3 x - \cos x = \frac{\cos^2 x - \sin^2 x}{\sec x}$

    c) $2cosA - secA = cosA - \frac{tanA}{cscA}$ d) $\frac{\cos a}{\sec a} + \frac{\sin a}{\csc a} = \sec^2 a - \tan^2 a$

    e) $\frac{\csc\theta + \cot\theta}{\tan\theta + \sin\theta} = \cot\theta\csc\theta$

7. Evaluate exactly using an appropriate identity.

    a) $sin165°sin15°$ b) $cos165° - cos75°$

Trigonometry Test 4 Practice, Chapter 4

ANSWERS:

1. a) $\sin(2x) = \frac{-4\sqrt{6}}{25}, \cos(2x) = \frac{-23}{25}, \tan(2x) = \frac{4\sqrt{6}}{23}, \sin\frac{x}{2} = \sqrt{\frac{2}{5}}, \cos\frac{x}{2} = -\sqrt{\frac{3}{5}},$

$$\tan\frac{x}{2} = \frac{-\sqrt{6}}{3} \ or \ -\sqrt{\frac{2}{3}}$$

   b) $\sin(2x) = \frac{-5}{13}, \cos(2x) = \frac{12}{13}, \tan(2x) = \frac{-5}{12}, \sin\frac{x}{2} = \sqrt{\frac{5+\sqrt{26}}{2\sqrt{26}}}, \cos\frac{x}{2} = \sqrt{\frac{-5+\sqrt{26}}{2\sqrt{26}}},$

$$\tan\frac{x}{2} = \frac{1}{-5+\sqrt{26}}$$

2. a) $sin = \frac{1+\sqrt{3}}{2\sqrt{2}} \ or \ \frac{\sqrt{2}+\sqrt{6}}{4}, cos = \frac{1-\sqrt{3}}{2\sqrt{2}} \ or \ \frac{\sqrt{2}-\sqrt{6}}{4}, tan = \frac{1+\sqrt{3}}{1-\sqrt{3}}$

   b) $sin = \frac{-\sqrt{3}-1}{2\sqrt{2}} \ or \ \frac{-\sqrt{6}-\sqrt{2}}{4}, cos = \frac{\sqrt{3}-1}{2\sqrt{2}} \ or \ \frac{\sqrt{6}-\sqrt{2}}{4}, tan = \frac{-\sqrt{3}-1}{\sqrt{3}-1} \ or \ \frac{-1-\sqrt{3}}{-1+\sqrt{3}}$

   c) $sin = \frac{-\sqrt{3}+1}{2\sqrt{2}} \ or \ \frac{-\sqrt{6}+\sqrt{2}}{4}, cos = \frac{1+\sqrt{3}}{2\sqrt{2}} \ or \ \frac{\sqrt{2}+\sqrt{6}}{4}, tan = \frac{1-\sqrt{3}}{1+\sqrt{3}}$

3. a) $\sin x = \frac{\sqrt{65}}{9}, \tan x = \frac{-\sqrt{65}}{4}, \csc x = \frac{9}{\sqrt{65}} \ or \ \frac{9\sqrt{65}}{65}, \sec x = \frac{-9}{4}, \cot x = \frac{-4}{\sqrt{65}} \ or \ \frac{-4\sqrt{65}}{65}$

   b) $\sin x = \frac{-11}{61}, \cos x = \frac{-60}{61}, \tan x = \frac{11}{60}, \csc x = \frac{-61}{11}, \cot x = \frac{60}{11}$

4. a) $\sin(x+y) = \frac{-2+5\sqrt{3}}{12}, \cos(x+y) = \frac{\sqrt{5}+2\sqrt{15}}{12}, \tan(x+y) = \frac{-2+5\sqrt{3}}{\sqrt{5}+2\sqrt{15}} \ or \ \frac{32\sqrt{5}-9\sqrt{15}}{55}, (x+y)$ in quad I

$$\sin(x-y) = \frac{-2-5\sqrt{3}}{12}, \cos(x-y) = \frac{\sqrt{5}-2\sqrt{15}}{12},$$

$$\tan(x-y) = \frac{-2-5\sqrt{3}}{\sqrt{5}-2\sqrt{15}} \ or \ \frac{32\sqrt{5}+9\sqrt{15}}{55}, (x-y)$$ in quad III

   b) $\sin(x+y) = \frac{-4\sqrt{2}+1}{3\sqrt{5}} \ or \ \frac{-4\sqrt{10}+\sqrt{5}}{15}, \cos(x+y) = \frac{2+2\sqrt{2}}{3\sqrt{5}} \ or \ \frac{2\sqrt{5}+2\sqrt{10}}{15},$

$$\tan(x+y) = \frac{-4\sqrt{2}+1}{2+2\sqrt{2}} \ or \ \frac{5\sqrt{2}-9}{2}, (x+y)$$ in quad IV

$$\sin(x-y) = \frac{-4\sqrt{10}-\sqrt{5}}{15}, \cos(x-y) = \frac{2\sqrt{5}-2\sqrt{10}}{15}, \tan(x-y)$$

$$= \frac{-4\sqrt{2}-1}{2-2\sqrt{2}} \ or \ \frac{5\sqrt{2}+9}{2}, (x-y)$$ in quad III

   c) $\sin(x+y) = \frac{-2}{5\sqrt{5}} \ or \ \frac{-2\sqrt{5}}{25}, \cos(x+y) = \frac{-11}{5\sqrt{5}} \ or \ \frac{-11\sqrt{5}}{25}, \tan(x+y) = \frac{2}{11}, (x+y)$ in quad III

$$\sin(x-y) = \frac{-2}{\sqrt{5}} \ or \ \frac{-2\sqrt{5}}{5}, \cos(x-y) = \frac{-1}{\sqrt{5}} \ or \ \frac{-\sqrt{5}}{5}, \tan(x-y) = 2, (x-y)$$ in quad III

5. a) Not an Identity, $x = \frac{\pi}{4}$, answers may vary.
    b) Not an Identity, $x = \frac{\pi}{4}$, answers may vary.
    c) Identity

7.   a) $\frac{-\sqrt{3}}{4} + \frac{1}{2} \ or \ \frac{1}{2} - \frac{\sqrt{3}}{4}$ b) $\frac{-\sqrt{3}}{\sqrt{2}} \ or \ \frac{-\sqrt{6}}{2}$