Note Title

6.1 Trig Identities

*All given on formula sheet — 2014-05-06

① $\csc x = \dfrac{1}{\sin x}$

② $\sec x = \dfrac{1}{\cos x}$

③ $\cot x = \dfrac{1}{\tan x}$

④ $\tan x = \dfrac{\sin x}{\cos x}$ $\quad \tan^2 x = \dfrac{\sin^2 x}{\cos^2 x}$

⑤ $\cot x = \dfrac{\cos x}{\sin x}$

⑥ $\sin^2 x + \cos^2 x = 1$ $\quad \cos^2 x = 1 - \sin^2 x$

⑦ $1 + \tan^2 x = \sec^2 x$

⑧ $1 + \cot^2 x = \csc^2 x$

Simplify

* Often more than one way / Use formula sheet

① $\dfrac{2\cos x}{1-\sin^2 x}$

$$\frac{2\cancel{\cos x}}{\cos^{\cancel{2}} x} = \frac{2}{\cos x} = 2\left(\frac{1}{\cos x}\right) = \boxed{2\sec x}$$

② $\sin x + \cos x \cot x$

$$\sin x + \cos x\left(\frac{\cos x}{\sin x}\right)$$

$$\frac{(\sin x)}{(\sin x)}\frac{\sin x}{1} + \frac{\cos^2 x}{\sin x}$$

$$\frac{\sin^2 x + \cos^2 x}{\sin x} = \frac{1}{\sin x} = \boxed{\csc x}$$

③ $(\sec^2 x - 1)(\cot^2 x)$

$$(\tan^2 x)\left(\frac{1}{\tan^2 x}\right)$$

$$\boxed{1}$$

OR

$$(\tan^2 x)\left(\frac{\cos^2 x}{\sin^2 x}\right)$$

$$\left(\frac{\cancel{\sin^2 x}}{\cancel{\cos^2 x}}\right)\left(\frac{\cancel{\cos^2 x}}{\cancel{\sin^2 x}}\right)$$

$$\boxed{1}$$

(4) $$\frac{\cos x\cot x+\cos x}{\cot x+\cot^2 x}$$

* Hint: Factor First

$$\frac{\cos x(\cot x+1)}{\cot x(1+\cot x)}$$

$$\frac{\cos x}{\frac{\cos x}{\sin x}} = \cancel{\cos x}\cdot\frac{\sin x}{\cancel{\cos x}} = \boxed{\sin x}$$

(5) $$\frac{\sin x}{1+\cos x}+\frac{\cos x}{\sin x}$$

* Common Denominator

$$\frac{\sin x(\sin x)}{(1+\cos x)(\sin x)}+\frac{\cos x(1+\cos x)}{\sin x(1+\cos x)}$$

$$= \frac{\sin^2 x+\cos x+\cos^2 x}{(1+\cos x)(\sin x)}$$

$$= \frac{\cancel{1+\cos x}\ 1}{(1+\cancel{\cos x})(\sin x)} = \boxed{\csc x}$$

(6) $$\frac{1+\sin x}{\cos x}-\frac{\cos x}{1-\sin x}$$

Pg 264

* 1 (all)

2(a,b,e), 3(c,e,i)

7(all)

$$\frac{1+\sin x}{\cos x}\frac{(1-\sin x)}{(1-\sin x)}-\frac{\cos x}{1-\sin x}\frac{(\cos x)}{(\cos x)}$$

$$\frac{1-\sin^2 x}{\cos x(1-\sin x)}-\frac{\cos^2 x}{\cos x(1-\sin x)}$$

OR

$$\frac{1-\sin^2 x-\cos^2 x}{\cos x(1-\sin x)}$$

$$\frac{\cos^2 x-\cos^2 x}{\cos x(1-\sin x)} = \boxed{0}$$

$$\frac{1-(\sin^2 x+\cos^2 x)}{\cos x(1-\sin x)}$$

$$\frac{1-1}{\cos x(1-\sin x)} = \boxed{0}$$

Note Title

6.1 Trig Identities Pt. 2

2014-05-06

Simplify

① $\frac{\sin x}{1+\cos x} + \frac{\sin x}{1-\cos x}$

$\frac{\sin x}{1+\cos x}\frac{(1-\cos x)}{(1-\cos x)} + \frac{\sin x}{1-\cos x}\frac{(1+\cos x)}{(1+\cos x)}$

$\frac{\sin x - \sin x\cos x + \sin x + \sin x\cos x}{(1+\cos x)(1-\cos x)}$

$\frac{2\sin x}{1-\cos^2 x} = \frac{2\cancel{\sin x}}{\sin^2 x} = \frac{2}{\sin x} = 2\left(\frac{1}{\sin x}\right) = \boxed{2\csc x}$

② $\frac{\cos x}{\sec x - 1} + \frac{\cos x}{\sec x + 1}$

$\frac{\cos x\,(\sec x+1)}{(\sec x-1)(\sec x+1)} + \frac{\cos x\,(\sec x-1)}{(\sec x+1)(\sec x-1)}$

$\frac{1+\cos x + 1 - \cos x}{\sec^2 x - 1}$

$= \frac{2}{\tan^2 x} = \boxed{2\cot^2 x}$

Simplify + state the restrictions for $0 \leq \theta < 2\pi$

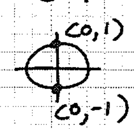
③ $\sin\theta\sec\theta$

$\sin\theta\left(\frac{1}{\cos\theta}\right)$

$\frac{\sin\theta}{\cos\theta}$

$\boxed{\tan\theta}$

Restrictions: $\cos\theta \neq 0$



$\boxed{\theta \neq \frac{\pi}{2}, \frac{3\pi}{2}}$

Simplify + state the restrictions for $0 \leq x < 2\pi$

④ $\frac{\sin x + \tan x}{\cos x + 1}$

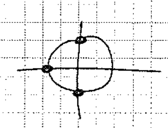
$\frac{\sin x + \frac{\sin x}{\cos x}}{\cos x + 1}$

$\frac{\frac{\sin x\cos x + \sin x}{\cos x}}{\cos x + 1} = \frac{\sin x\,\cancel{(\cos x+1)}}{\cos x} \cdot \frac{1}{\cancel{\cos x + 1}}$

$= \frac{\sin x}{\cos x} = \boxed{\tan x}$

$\cos x \neq -1$

$\cos x \neq 0$



$$\boxed{x \neq \frac{\pi}{2}, \pi, \frac{3\pi}{2}}$$

⑤ $\dfrac{1+\tan x}{1+\cot x}$

$$\frac{1+\frac{\sin x}{\cos x}}{1+\frac{\cos x}{\sin x}} = \frac{\frac{\cos x+\sin x}{\cos x}}{\frac{\sin x+\cos x}{\sin x}} = \frac{\cancel{\cos x+\sin x}}{\cos x}\cdot\frac{\sin x}{\cancel{\sin x+\cos x}}$$

$$= \frac{\sin x}{\cos x}$$

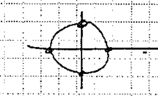
$$= \boxed{\tan x}$$

$\dfrac{1+\tan x}{1+\cot x}$

$$\frac{1+\tan x}{1+\frac{1}{\tan x}} = \frac{1+\tan x}{\frac{\tan x+1}{\tan x}} = \cancel{1+\tan x}\cdot\frac{\tan x}{\cancel{\tan x+1}}$$

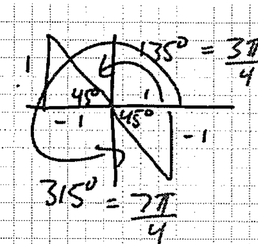
$$= \boxed{\tan x}$$

$\cos x \neq 0$



$\sin x \neq 0$

$\cot x - 1 = \tan x \neq -1$



$$\boxed{x \neq 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, \frac{3\pi}{4}, \frac{7\pi}{4}}$$

Pg 264 #2(c,d,f) #3(f,g), 6

*WORKSHEET

Note Title 2012-11-27

6.2 Verifying Trig Identities Pt. 1

HINTS / STRATEGIES FOR PROVING IDENTITIES

1. Convert both sides to sinx's & cosx's
2. Start with more complicated side
3. If you have a binomial, multiply the top and bottom by the conjugate.

   Ex $\dfrac{\sin x}{1-\cos x}\dfrac{(1+\cos x)}{(1+\cos x)}$ OR $\dfrac{1+\sin x}{\cos x}\dfrac{(1-\sin x)}{(1-\sin x)}$

4. Force the denominator

   Ex $\dfrac{\csc x}{\tan x+\cot x}=\cos x\,\dfrac{(\tan x+\cot x)}{(\tan x+\cot x)}$

① Prove $1+\tan^2 x=\sec^2 x$

$$\frac{\cos^2 x}{\cos^2 x}+\frac{\sin^2 x}{\cos^2 x}$$

$$\frac{\cos^2 x+\sin^2 x}{\cos^2 x}$$

$$\frac{1}{\cos^2 x}$$

$$\sec^2 x$$

L.S. = R.S.

① Prove $\dfrac{\cos\theta}{1+\sin\theta}+\dfrac{\cos\theta}{1-\sin\theta}=2\sec\theta$

$$\frac{\cos\theta}{1+\sin\theta}\frac{(1-\sin\theta)}{(1-\sin\theta)}+\frac{\cos\theta}{1-\sin\theta}\frac{(1+\sin\theta)}{(1+\sin\theta)}$$

$$\frac{\cos\theta-\cos\theta\sin\theta}{1-\sin^2\theta}+\frac{\cos\theta+\cos\theta\sin\theta}{1-\sin^2\theta}$$

$$\frac{2\cos\theta}{\cos^2\theta}=\frac{2}{\cos\theta}=2\left(\frac{1}{\cos\theta}\right)$$

$$2\sec\theta$$

L.S. = R.S.

② Prove $\dfrac{\cos\theta}{\sec\theta-1}+\dfrac{\cos\theta}{\sec\theta+1}=2\cot^2\theta$

$$\frac{\cos\theta}{\sec\theta-1}\frac{(\sec\theta+1)}{(\sec\theta+1)}+\frac{\cos\theta}{\sec\theta+1}\frac{(\sec\theta-1)}{(\sec\theta-1)}$$

$$\frac{\cos\theta\sec\theta+\cos\theta+\cos\theta\sec\theta-\cos\theta}{\sec^2\theta-1}$$

$$\frac{2\cos\theta\sec\theta}{\sec^2\theta-1}=\frac{2}{\tan^2\theta}$$

$$=2\cot^2\theta$$

L.S. = R.S.

③ Prove $\frac{\sec x}{\cot x + \tan x} = \sin x$

$\frac{\sin x}{1} \frac{(\cot x + \tan x)}{(\cot x + \tan x)}$

$\frac{\sin x\left(\frac{\cos x}{\sin x}\right) + \sin x\left(\frac{\sin x}{\cos x}\right)}{\cot x + \tan x}$

$\frac{(\cancel{\sin x})(\cos x)}{\cancel{\sin x}}$

$\frac{\cos x}{1}$

$\frac{\frac{\cos^2 x}{\cos x} + \frac{\sin^2 x}{\cos x}}{\cot x + \tan x}$

$\frac{\frac{1}{\cos x}}{\cot x + \tan x} = \frac{\sec x}{\cot x + \tan x}$

L.S. = R.S

$\frac{\sec x}{\cot x + \tan x} \neq \sin x$

$\frac{\frac{1}{\cos x}}{\frac{(\cos x)}{(\cos x)}\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}\frac{(\sin x)}{(\sin x)}}$

$\frac{\frac{1}{\cos x}}{\frac{1}{\cos x \sin x}}$

$\frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}\sin x}{1}$

$\sin x$

L.S. = R.S.

④ Prove $\csc x + \cot x \neq \frac{\sin x}{1 - \cos x}$

State the restrictions $0 \leq x < 2\pi$

$\frac{1}{\sin x} + \frac{\cos x}{\sin x}$

$\frac{1 + \cos x}{\sin x}$

$\frac{\sin x}{1 - \cos x}\frac{(1 + \cos x)}{(1 + \cos x)}$

$\frac{\sin x(1 + \cos x)}{1 - \cos^2 x}$

$\frac{\cancel{\sin x}(1 + \cos x)}{\sin^{\cancel{2}} x}$

$\frac{1 + \cos x}{\sin x}$

L.S. = R.S.

$\sin x \neq 0$, $\cos x \neq \pm 1$

$\boxed{x \neq 0, \pi}$

Pg 271
1-25
(odds)

Note Title 2012-11-27

6.2 Pt. 2

PROVE + STATE THE RESTRICTIONS $0 \leq \theta < 2\pi$

(1) $\dfrac{\sec\theta}{\sin\theta} - \dfrac{\sin\theta}{\cos\theta} = \cot\theta$

(2) $\dfrac{\sin\theta}{1+\cos\theta} = \dfrac{1-\cos\theta}{\sin\theta}$

(1) $\dfrac{\sec\theta}{\sin\theta} - \dfrac{\sin\theta}{\cos\theta} = \cot\theta$

$\dfrac{1}{\sin\theta\cos\theta} - \dfrac{\sin\theta(\sin\theta)}{\cos\theta(\sin\theta)}$

$\dfrac{1-\sin^2\theta}{\sin\theta\cos\theta}$

$\dfrac{\cos^{\cancel{2}}\theta}{\sin\theta\cancel{\cos\theta}}$

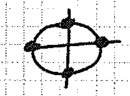
$\dfrac{\cos\theta}{\sin\theta}$

$\cot\theta$

L.S = R.S

Restrictions:

$\sin\theta \neq 0 \quad \cos\theta \neq 0$



$\theta \neq 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}$

(2) $\dfrac{\sin\theta}{1+\cos\theta} = \dfrac{1-\cos\theta}{\sin\theta}$

$\dfrac{\sin\theta\,(1-\cos\theta)}{1+\cos\theta\,(1-\cos\theta)}$

$\dfrac{\sin\theta(1-\cos\theta)}{1-\cos^2\theta}$

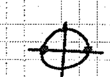
$\dfrac{\cancel{\sin\theta}(1-\cos\theta)}{\sin^{\cancel{2}}\theta}$

$\dfrac{1-\cos\theta}{\sin\theta}$

L.S. = R.S

Restrictions

$\cos\theta \neq \pm 1 \quad \sin\theta \neq 0$



$\theta \neq 0, \pi$

(3) $$\frac{1-\cos\theta}{\sin\theta} = \frac{1}{\csc\theta + \cot\theta}$$

(3) $$\frac{1-\cos\theta}{\sin\theta} = \frac{1}{\csc\theta + \cot\theta}$$

$$\frac{1}{\frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta}}$$

$$\frac{1}{\frac{1+\cos\theta}{\sin\theta}}$$

$$\frac{\sin\theta}{1+\cos\theta}\cdot\frac{(1-\cos\theta)}{(1-\cos\theta)}$$

$$\frac{\sin\theta(1-\cos\theta)}{1-\cos^2\theta}$$

$$\frac{\cancel{\sin\theta}(1-\cos\theta)}{\sin^2\theta}$$

$$\frac{1-\cos\theta}{\sin\theta}$$

L.S.=R.S.

Restrictions

$\sin\theta \neq 0$ $\cos\theta \neq \pm 1$

$\theta \neq 0, \pi$

(4) $(\tan x - 1)^2 = \sec^2 x - 2\tan x$

(4) $(\tan x - 1)^2 = \sec^2 x - 2\tan x$

$(\tan x - 1)(\tan x - 1)$

$\tan^2 x - 2\tan x + 1$

$\tan^2 x + 1 - 2\tan x$

$\sec^2 x - 2\tan x$

L.S.=R.S.

$\tan x = \frac{\sin x}{\cos x} \rightarrow$

$\sec^2 x = \frac{1}{\cos^2 x}$

Restrictions

$\cos x \neq 0$

$\frac{\pi}{2}$

$\frac{3\pi}{2}$

$x \neq \frac{\pi}{2}, \frac{3\pi}{2}$

Pg 271
2-24
(evens)

Note Title 2011-04-11

6.3 Solving Trig Equations Pt.1

To solve a trig equation:

1) Factor if possible → "Determine exact values"

2) Calculator → $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$

→ "Decimal places"

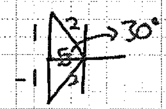
3) Quadratic Formula → Same trig functions but can't be factored

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

① Solve $0 \leq \theta < 2\pi$

a) $2\cos\theta + \sqrt{3} = 0$

$\cos\theta = \frac{-\sqrt{3}}{2}$



$\theta = 150°, 210°$

$\boxed{\theta = \frac{5\pi}{6}, \frac{7\pi}{6}}$

b) $2\cos 3\theta + \sqrt{3} = 0$

$\cos 3\theta = \frac{-\sqrt{3}}{2}$ $\cos\theta = \frac{-\sqrt{3}}{2}$?

$\frac{5\pi}{6} \times \frac{1}{3}$ $\frac{7\pi}{6} \times \frac{1}{3}$ Gives the first two answers

Add the period up to 2π

$T = \frac{2\pi}{3} = \frac{12\pi}{18}$

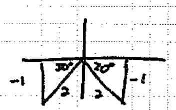
Stop at 2π

$\boxed{\frac{5\pi}{18}, \frac{7\pi}{18}, \frac{17\pi}{18}, \frac{19\pi}{18}, \frac{29\pi}{18}, \frac{31\pi}{18}}$

c) $2\sin 4\theta = -1$

$\sin 4\theta = -\frac{1}{2}$

$\sin\theta = -\frac{1}{2}$?



$210°, 330°$

$\frac{7\pi}{6}, \frac{11\pi}{6}$

$\times \frac{1}{4}$

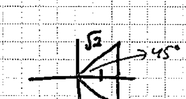
$+\frac{2\pi}{4} = \frac{12\pi}{24}$

$\boxed{\frac{7\pi}{24}, \frac{11\pi}{24}, \frac{19\pi}{24}, \frac{23\pi}{24}, \frac{31\pi}{24}, \frac{35\pi}{24}, \frac{43\pi}{24}, \frac{47\pi}{24}}$

d) $\sqrt{2}\cos 3\theta = 1$

$\cos 3\theta = \frac{1}{\sqrt{2}}$

$\cos\theta = \frac{1}{\sqrt{2}}$?



$45°, 315°$

$\frac{\pi}{4}, \frac{7\pi}{4}$

$\times \frac{1}{3}$

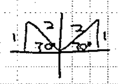
$+ T = \frac{2\pi}{3} = \frac{8\pi}{12}$

$\boxed{\frac{\pi}{12}, \frac{7\pi}{12}, \frac{9\pi}{12}, \frac{15\pi}{12}, \frac{17\pi}{12}, \frac{23\pi}{12}}$

e) $2\sin\frac{1}{3}x = 1$

$\sin\frac{1}{3}x = \frac{1}{2}$

$\sin x = \frac{1}{2}$?



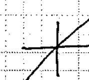
$x = 30°, 150°$

$x = \frac{\pi}{6}, \frac{5\pi}{6}$

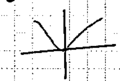
$\times 2 \quad x = \frac{2\pi}{6}, \frac{10\pi}{6}$

$\boxed{x = \frac{\pi}{3}, \frac{5\pi}{3}}$

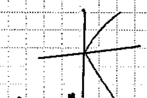
When using calculator:

tan 

$\pi + \angle$ "angle"

sine 

$\pi - \angle$ "angle"

cosine 

$2\pi - \angle$ "angle"

② Solve $0 \leq x < 2\pi$

a) $\sec x = -2.3124$

$\cos x = \frac{1}{-2.3124}$

$x = \cos^{-1}\left(-\frac{1}{2.3124}\right)$

$x = 2.02$ cos: $2\pi -$

$2\pi - 2.02$

4.27

$\boxed{x = 2.02, 4.27}$

b) $\sec 2x = -2.3124$

$\times \frac{1}{2}$ and add period $\frac{2\pi}{2} = \pi$

$\frac{2.02}{2} = 1.01 \quad \frac{4.27}{2} = 2.13$

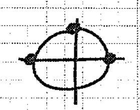
$\boxed{x = 1.01, 2.13, 4.15, 5.27}$

$+\pi$

③ Determine the exact values of $\sin^2 x - \sin x = 0$, where $0° \leq x < 360°$.

$\sin x(\sin x - 1) = 0$

$\sin x = 0 \quad \sin x = 1$



$\boxed{x = 0°, 90°, 180°}$

Note Title 2008-04-15

(4) Find the exact values for $2\cos^2 x - \cos x - 1 = 0$, where $0 \leq x < 2\pi$.

Let $y = \cos x$ "Stunt Variable"

$2y^2 - y - 1 = 0$

$2y^2 - 2y + y - 1 = 0$

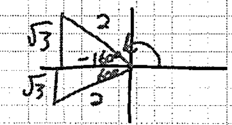
$2y(y-1) + 1(y-1) = 0$

$(2y+1)(y-1) = 0$

$y = -\frac{1}{2} \quad y = 1$

$\therefore \cos x = -\frac{1}{2} \quad \cos x = 1$

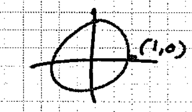
$\cos x = -\frac{1}{2}$



$x = 120°, 240°$

$\frac{2\pi}{3} \quad \frac{4\pi}{3}$

$\cos x = 1$



$x = 0°$

$$\boxed{x = 0, \frac{2\pi}{3}, \frac{4\pi}{3}}$$

(5) Solve $6\sin^2 x + 11\sin x - 10 = 0$, $0 \leq x < 2\pi$

Let $y = \sin x$

$6y^2 + 11y - 10 = 0$

$6y^2 + 15y - 4y - 10 = 0$

$3y(2y+5) - 2(2y+5) = 0$

$(3y-2)(2y+5) = 0$

$y = \frac{2}{3} \quad y = \cancel{\frac{-5}{2}} \quad \frac{Opp}{Hyp} \quad Hyp > Opp$

$\sin x = \frac{2}{3}$

$x = \sin^{-1}\left(\frac{2}{3}\right)$

$\pi - 0.73$

$$\boxed{x = 0.73 \text{ AND } 2.41}$$

Pg 281

1-5 (a,c,e)

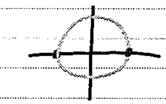
(ONLY $0 \leq x < 2\pi$)

6.3 Trig Equations Pt. 2

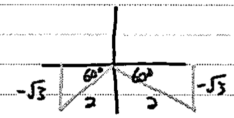
Note Title 2008-04-16

① Solve $2\sin^2 x + \sqrt{3}\sin x = 0$, $0 \leq x < 2\pi$

$\sin x(2\sin x + \sqrt{3}) = 0$ $\qquad \sin x = 0 \qquad \sin x = \frac{-\sqrt{3}}{2}$



$x = 0, \pi$

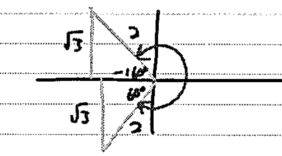


$x = 240°, 300°$

$$\boxed{x = 0, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}}$$

② Solve $\cos\theta = \frac{-1}{2}$, $-\pi \leq \theta \leq \pi$

$\cos\theta = -\frac{1}{2}$

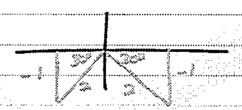


$\theta = 120°, -120°$

$$\boxed{\theta = \frac{2\pi}{3}, \frac{-2\pi}{3}}$$

③ Solve $\csc\theta = -2 \quad -\pi \leq \theta \leq \pi$

$\sin\theta = \frac{1}{-2}$



$\theta = -30°, -150°$

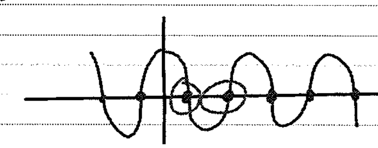
$$\boxed{\theta = -\frac{\pi}{6}, -\frac{5\pi}{6}}$$

GENERAL SOLUTION

To determine the general solution:

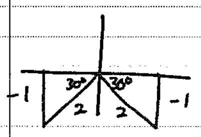
1. Find the first 2 answers $\quad$ sin/cos $\frac{2\pi}{6}$ $\quad$ tan $\frac{\pi}{6}$
2. Add n times the period where $n \in I$.

* Gives a summary of all of the possible solutions.



③ Determine the general solution for:

a) $\sin x = -\frac{1}{2}$



$x = 210°, 330°$ $\quad T = 360°$

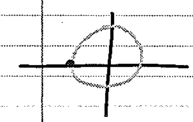
OR

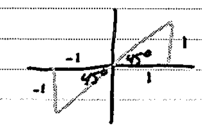
$x = \frac{7\pi}{6}, \frac{11\pi}{6}$ $\quad T = 2\pi$

$$\boxed{x = 210° + n360°,\ x = 330° + n360°\ \ n \in I \quad \text{OR} \quad x = \frac{7\pi}{6} + n2\pi,\ x = \frac{11\pi}{6} + n2\pi\ \ n \in I}$$

b) $(\cos x + 1)(\tan x - 1) = 0$

$\cos x = -1$ $\qquad$ $\tan x = 1$





$x = \pi$ $\qquad$ $x = 45°, 225°$

OR

$x = \frac{\pi}{4}, \frac{5\pi}{4}$

$$\boxed{\begin{array}{l} x = \pi + n2\pi \\ x = \frac{\pi}{4} + n\pi \\ x = \frac{5\pi}{4} + n\pi \end{array} \quad n \in I}$$

④ Solve $\tan^2 x + 6\tan x - 7 = 0$ over the real numbers.
(same as general solution)

Let $y = \tan x$

$y^2 + 6y - 7 = 0$

$(y+7)(y-1) = 0$

$y = -7, y = 1$

$\tan x = -7$

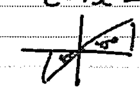
~~$x = \tan^{-1}(-7)$~~

$x = -1.43$

(Must be positive $+\pi$)

$x = 1.71, 4.85$

$\tan x = 1$



$x = \frac{\pi}{4}, \frac{5\pi}{4}$

$$\boxed{\begin{array}{l} x = 1.71 + n\pi \\ x = \frac{\pi}{4} + n\pi \end{array} \quad n \in I}$$

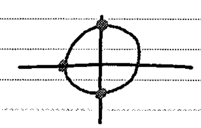
⑤ Solve $\cos^2 2x + \cos 2x = 0$:

a) $0 \le x < 2\pi$

$\cos 2x\,(\cos 2x + 1) = 0$

$\cos 2x = 0 \quad \cos 2x = -1$

$\cos x = 0$? $\quad \cos x = -1$?



$x = \frac{\pi}{2}, \pi, \frac{3\pi}{2} \times \frac{1}{2}$

$\cos 2x$:

Multiply by $\frac{1}{2}$ since $\cos 2x$ + add the period (π)

$$x = \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}$$

$$\boxed{x = \frac{\pi}{4}, \frac{5\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{2}, \frac{3\pi}{4}, \frac{7\pi}{4}}$$

$+\frac{4\pi}{4}$ $\quad +\frac{2\pi}{2}$ $\quad +\frac{4\pi}{4}$

b) General Solution?

$$x = \begin{cases} \frac{\pi}{4} + n\pi \\ \frac{3\pi}{4} + n\pi \quad n \in I \\ \frac{\pi}{2} + n\pi \end{cases}$$

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#1-5 (b,d,f)

↳ General Solution Only

Note Title 2012-12-03

6.4 Sum and Difference Identities

1. $\cos(A+B) = \cos A\cos B - \sin A\sin B$
2. $\cos(A-B) = \cos A\cos B + \sin A\sin B$
3. $\sin(A+B) = \sin A\cos B + \sin B\cos A$
4. $\sin(A-B) = \sin A\cos B - \sin B\cos A$
5. $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A\tan B}$
6. $\tan(A-B) = \dfrac{\tan A - \tan B}{1 + \tan A\tan B}$

(1) Express as a single trig function

$$\sin\left(\frac{5\pi}{6}\right)\cos\left(\frac{3\pi}{8}\right) - \sin\left(\frac{3\pi}{8}\right)\cos\left(\frac{5\pi}{6}\right)$$

$\sin(A-B) = \sin A\cos B - \sin B\cos A$

$$\sin\left(\frac{5\pi}{6} - \frac{3\pi}{8}\right)$$

$$\sin\left(\frac{20\pi}{24} - \frac{9\pi}{24}\right) = \boxed{\sin\frac{11\pi}{24}}$$

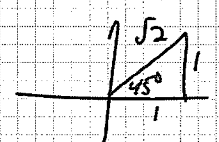
(2) Simplify

a) $$\frac{\tan\frac{2\pi}{5} - \tan\frac{3\pi}{20}}{1 + \tan\frac{2\pi}{5}\tan\frac{3\pi}{20}}$$

$$= \tan\left(\frac{2\pi}{5} - \frac{3\pi}{20}\right)$$

$$= \tan\left(\frac{8\pi}{20} - \frac{3\pi}{20}\right) = \tan\left(\frac{5\pi}{20}\right) = \tan\frac{\pi}{4} = \boxed{1}$$

"single trig function"



b) $$\frac{\sin 5x}{\sec x} - \frac{\cos 5x}{\csc x}$$

$$\frac{\sin 5x}{\frac{1}{\cos x}} - \frac{\cos 5x}{\frac{1}{\sin x}}$$

$\sin 5x\cos x - \sin x\cos 5x$

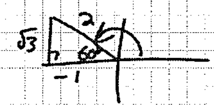
$\sin(5x - x)$

$\boxed{\sin 4x}$

(2) Determine the exact value

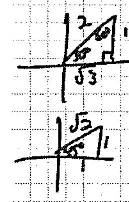
a) $\cos 170^\circ \cos 50^\circ + \sin 170^\circ \sin 50^\circ$

$\cos(170^\circ - 50^\circ) = \cos 120^\circ$



$= \boxed{-\frac{1}{2}}$

b) $\sin 75^\circ$



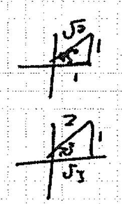
$= \sin(30^\circ + 45^\circ)$

$= \sin 30^\circ \cos 45^\circ + \sin 45^\circ \cos 30^\circ$

$= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right)$

$= \frac{1}{2\sqrt{2}} + \frac{\sqrt{3}}{2\sqrt{2}} = \boxed{\frac{1+\sqrt{3}}{2\sqrt{2}}}$ OR $\boxed{\frac{\sqrt{2}+\sqrt{6}}{4}}$

c) $\sec 15^\circ$ $\quad \frac{1}{\cos 15^\circ} = \frac{1}{\cos(45^\circ - 30^\circ)}$



$$\frac{1}{\cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ}$$

$$\frac{1}{\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{2}\right)}$$

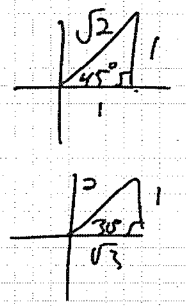
$$\frac{1}{\frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}}}$$

$$\frac{1}{\frac{\sqrt{3}+1}{2\sqrt{2}}} = \boxed{\frac{2\sqrt{2}}{\sqrt{3}+1}} \frac{(\sqrt{3}-1)}{(\sqrt{3}-1)} \quad \text{OR} \quad \frac{2\sqrt{6}-2\sqrt{2}}{2}$$

$\boxed{\sqrt{6}-\sqrt{2}}$

c) $\tan 15^\circ$

$$\tan(45^\circ - 30^\circ) = \frac{\tan 45^\circ - \tan 30^\circ}{1 + \tan 45^\circ \tan 30^\circ}$$



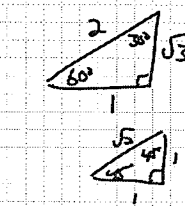
$$= \frac{1 - \frac{1}{\sqrt{3}}}{1 + \frac{1}{\sqrt{3}}} = \frac{\frac{\sqrt{3}-1}{\sqrt{3}}}{\frac{\sqrt{3}+1}{\sqrt{3}}}$$

$$= \boxed{\frac{\sqrt{3}-1}{\sqrt{3}+1}}$$

d) $\cos \frac{7\pi}{12}$

$$= \cos\left(\frac{4\pi}{12} + \frac{3\pi}{12}\right)$$

$$= \cos\left(\frac{\pi}{3} + \frac{\pi}{4}\right) = \cos\frac{\pi}{3}\cos\frac{\pi}{4} - \sin\frac{\pi}{3}\sin\frac{\pi}{4}$$



$$= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$$

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\# 1, 2 (not i, j)

$$= \frac{1}{2\sqrt{2}} - \frac{\sqrt{3}}{2\sqrt{2}} = \boxed{\frac{1-\sqrt{3}}{2\sqrt{2}}} \text{ OR } \boxed{\frac{\sqrt{2}-\sqrt{6}}{4}}$$

e) $\cot\left(-\frac{5\pi}{12}\right)$

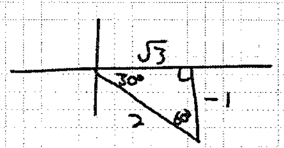
$$= \cot\left(-\frac{2\pi}{12} - \frac{3\pi}{12}\right)$$

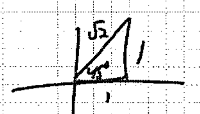
$$= \cot\left(-\frac{\pi}{6} - \frac{\pi}{4}\right)$$

$$-\frac{\pi}{6} - \frac{\pi}{4}$$

$$-\frac{2\pi}{12} - \frac{3\pi}{12} = -\frac{5\pi}{12}$$

$$= \frac{1}{\tan\left(-\frac{\pi}{6} - \frac{\pi}{4}\right)} = \frac{1}{\frac{\tan\left(-\frac{\pi}{6}\right) - \tan\left(\frac{\pi}{4}\right)}{1 + \tan\left(-\frac{\pi}{6}\right)\tan\left(\frac{\pi}{4}\right)}}$$





$$= \frac{1}{\frac{\frac{-1}{\sqrt{3}} - 1}{1 + \left(-\frac{1}{\sqrt{3}}\right)(1)}} = \frac{1 - \frac{1}{\sqrt{3}}}{\frac{-1}{\sqrt{3}} - 1}$$

$$= \frac{\frac{\sqrt{3}-1}{\cancel{\sqrt{3}}}}{\frac{-1-\sqrt{3}}{\cancel{\sqrt{3}}}} = \boxed{\frac{\sqrt{3}-1}{-1-\sqrt{3}}} \text{ OR } \boxed{\frac{1-\sqrt{3}}{1+\sqrt{3}}}\frac{(1-\sqrt{3})}{(1-\sqrt{3})}$$

$$\text{OR } \frac{1-2\sqrt{3}+3}{-2} = \frac{4-2\sqrt{3}}{-2}$$

$$\boxed{\sqrt{3}-2}$$

Pg 292

#1, 2 (not i, j)

Note Title 2012-12-04

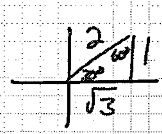
6.4 Pt.1 Review

① Express as a single trig function + determine the exact value

a) $\cos 80^\circ \cos 50^\circ + \sin 80^\circ \sin 50^\circ$

$\cos(80^\circ - 50^\circ) = \boxed{\cos 30^\circ}$

$= \boxed{\frac{\sqrt{3}}{2}}$



b) $\sin\frac{\pi}{3}\cos\frac{\pi}{4} - \cos\frac{\pi}{3}\sin\frac{\pi}{4}$

$\sin\left(\frac{\pi}{3} - \frac{\pi}{4}\right) = \sin\left(\frac{4\pi}{12} - \frac{3\pi}{12}\right)$

$= \boxed{\sin\left(\frac{\pi}{12}\right)}$

$\left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$

$\frac{\sqrt{3}}{2\sqrt{2}} - \frac{1}{2\sqrt{2}} = \boxed{\frac{\sqrt{3}-1}{2\sqrt{2}} \text{ or } \frac{\sqrt{6}-\sqrt{2}}{4}}$

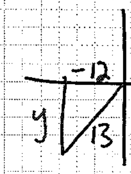
Note Title 2012-12-03

6.4 Pt.2

① If both A and B are third quadrant angles, what is the value of $\sin(A-B)$ if $\sin A = -\frac{3}{5}$ and $\cos B = \frac{-12}{13}$?

$\sin(A-B) = \sin A\cos B - \sin B\cos A$

$= \left(\frac{-3}{5}\right)\left(\frac{-12}{13}\right) - \sin B\cos A$

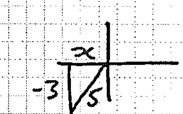


$y = \sqrt{13^2 - (-12)^2}$

$y = \sqrt{25}$

$y = -5$

$\sin B = \frac{-5}{13}$



$x = \sqrt{5^2 - (-3)^2}$

$x = \sqrt{25-9}$

$x = \sqrt{16} = -4$

$\cos A = \frac{-4}{5}$

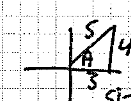
$= \left(\frac{-3}{5}\right)\left(\frac{-12}{13}\right) - \sin B\cos A$

$= \left(\frac{-3}{5}\right)\left(\frac{-12}{13}\right) - \left(\frac{-5}{13}\right)\left(\frac{-4}{5}\right)$

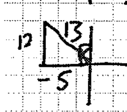
$= \frac{36}{65} - \frac{20}{65}$

$= \boxed{\frac{16}{65}}$

② If $\cos A = \frac{3}{5}$, $0 \le \angle A \le \frac{\pi}{2}$ and $\sin B = \frac{12}{13}$, $\frac{\pi}{2} \le \angle B \le \pi$ determine the exact value of $\cos(A+B)$.



$\sin A = \frac{4}{5}$



$\cos B = \frac{-5}{13}$

$\cos(A+B) = \cos A\cos B - \sin A\sin B$

$= \left(\frac{3}{5}\right)\cos B - \sin A\left(\frac{12}{13}\right)$

$= \left(\frac{3}{5}\right)\left(\frac{-5}{13}\right) - \left(\frac{4}{5}\right)\left(\frac{12}{13}\right)$

$= \frac{-15}{65} - \frac{48}{65}$

$= \boxed{\frac{-63}{65}}$

(3) Simplify $\sin\left(x+\frac{\pi}{3}\right)+\sin\left(x-\frac{\pi}{3}\right)$

$$\sin x\cos\frac{\pi}{3}+\cancel{\sin\frac{\pi}{3}\cos x}+\sin x\cos\frac{\pi}{3}\cancel{-\sin\frac{\pi}{3}\cos x}$$

$$=2\sin x\cos\frac{\pi}{3}$$

$$=2\sin x\left(\frac{1}{2}\right)$$

$$=\boxed{\sin x}$$

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* 3 (b, c, e)
6 (a, c)

Note Title

6.5 Double-Angle Identities

2012-12-04

① $\sin 2\theta = 2\sin\theta\cos\theta$

② $\cos 2\theta = \cos^2\theta - \sin^2\theta$

or

$1 - 2\sin^2\theta$

or

$2\cos^2\theta - 1$

③ $\tan 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$

$\sin 4\theta = \sin 2(2\theta)$

$= 2\sin 2\theta \cos 2\theta$

$\sin 10x = \sin 2(5x)$

$= 2\sin 5x \cos 5x$

$\sin\theta\cos\theta = \dfrac{\sin 2\theta}{2}$

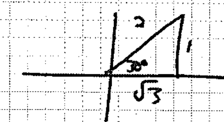
① Simplify + determine the exact value

a) $2\sin\frac{\pi}{12}\cos\frac{\pi}{12}$

$2\sin\theta\cos\theta = \sin 2\theta$

$\sin 2\left(\frac{\pi}{12}\right)$

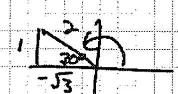
$\sin\frac{2\pi}{12} = \boxed{\sin\frac{\pi}{6}} = \boxed{\frac{1}{2}}$



b) $\sin\frac{5\pi}{12}\cos\frac{5\pi}{12}$

$\sin 2\theta = 2\sin\theta\cos\theta \quad \therefore \quad \sin\theta\cos\theta = \dfrac{\sin 2\theta}{2}$

$\dfrac{\sin 2\left(\frac{5\pi}{12}\right)}{2} = \dfrac{\sin\left(\frac{5\pi}{6}\right)}{2}$



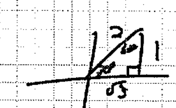
$= \dfrac{\frac{1}{2}}{2} = \frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$= \boxed{\frac{1}{4}}$

c) $\cos^2\frac{\pi}{12} - \sin^2\frac{\pi}{12}$

$\cos^2\theta - \sin^2\theta = \cos 2\theta$

$= \cos\left(2\left(\frac{\pi}{12}\right)\right) = \cos\frac{\pi}{6}$



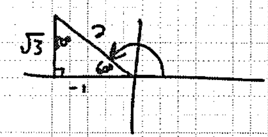
$= \boxed{\frac{\sqrt{3}}{2}}$

d) $12\cos^2\frac{\pi}{3} - 6$

$6\left(2\cos^2\frac{\pi}{3} - 1\right)$

$6\left(\cos 2\left(\frac{\pi}{3}\right)\right)$ $\rightarrow \cos 2\theta = 2\cos^2\theta - 1$

$6\left(\cos\frac{2\pi}{3}\right)$



$6\left(\frac{-1}{2}\right)$

$\boxed{-3}$

② Prove $\frac{1}{1-\sin\theta} = \frac{2\sin\theta(\sec\theta + \tan\theta)}{\sin 2\theta}$

$\frac{1+\sin\theta}{(1-\sin\theta)(1+\sin\theta)}$

$\frac{1+\sin\theta}{1-\sin^2\theta}$

$\frac{1+\sin\theta}{\cos^2\theta}$

$\frac{\cancel{2}\cancel{\sin\theta}\left(\frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}\right)}{\cancel{2}\cancel{\sin\theta}\cos\theta}$

$\frac{\frac{1+\sin\theta}{\cos\theta}}{\cos\theta}$

$\frac{1+\sin\theta}{\cos^2\theta}$ $\rightarrow$ OR $\frac{1+\sin\theta}{1-\sin^2\theta}$

$\frac{\cancel{1+\sin\theta}}{(\cancel{1+\sin\theta})(1-\sin\theta)}$

$\frac{1}{1-\sin\theta}$

L.S.=R.S.

③ Prove $\frac{\cos 2\theta}{\sin\theta} + \frac{\sin 2\theta}{\cos\theta} = \csc\theta$ and state restrictions.

$\frac{\cos 2\theta\cos\theta}{\sin\theta\cos\theta} + \frac{\sin 2\theta\sin\theta}{\sin\theta\cos\theta}$

$\frac{\cos 2\theta\cos\theta + \sin 2\theta\sin\theta}{\sin\theta\cos\theta}$

$\frac{\cos(2\theta - \theta)}{\sin\theta\cos\theta}$

$\frac{\cancel{\cos\theta}}{\sin\theta\cancel{\cos\theta}}$ $\frac{1}{\sin\theta} = \csc\theta$

L.S.=R.S.

Restrictions:

$\sin\theta \neq 0, \cos\theta \neq 0$

$\boxed{\theta \neq \frac{n\pi}{2}\ n \in I}$

OR $\frac{\cos 2\theta}{\sin\theta} + \frac{\sin 2\theta}{\cos\theta} = \csc\theta$

$\frac{1-2\sin^2\theta}{\sin\theta} + \frac{2\sin\theta\cancel{\cos\theta}}{\cancel{\cos\theta}}$

$\frac{1-2\sin^2\theta}{\sin\theta} + \frac{2\sin^2\theta}{\sin\theta}$

$\frac{1}{\sin\theta}$

$\csc\theta$

L.S. = R.S.

Restrictions:

$\sin\theta \neq 0, \cos\theta \neq 0$

$\boxed{\theta \neq \frac{n\pi}{2}\ n \in I}$

R_x 300
1(a, c, e)
3 a)

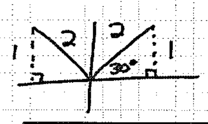
Note Title

Chp 6 Review

2007-11-21

① Determine the general solution of $\sin 3x = \frac{1}{2}$

$\sin x = \frac{1}{2}$?



$x = 30°, 150°$ OR $\frac{\pi}{6}, \frac{5\pi}{6}$ $\times \frac{1}{3}$

$\therefore \sin 3x = \frac{1}{2}$ when $x = \frac{\pi}{18}, \frac{5\pi}{18}$

$$\boxed{\begin{array}{c} x = \frac{\pi}{18} + n\frac{2\pi}{3} \text{ and } x = \frac{5\pi}{18} + n\frac{2\pi}{3} \quad n \in I \\ \text{OR} \\ x = 10° + n120° \text{ and } x = 50° + n120° \quad n \in I \end{array}}$$

② Solve $2\cos^2 x + \cos x - 1 = 0$ where $0 \le x < 2\pi$

Let $y = \cos x$

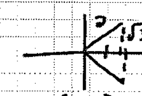
$2y^2 + y - 1 = 0$

$2y^2 + 2y - y - 1 = 0$

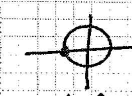
$2y(y+1) - (y+1) = 0$

$(2y-1)(y+1) = 0$

$y = \frac{1}{2}, y = -1$ $\therefore \cos x = \frac{1}{2}$ $\cos x = -1$



$x = 60°, 300°$ OR $x = \frac{\pi}{3}, \frac{5\pi}{3}$



$x = 180°$ OR π

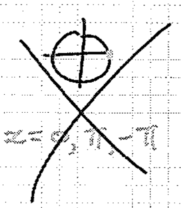
$$\boxed{\therefore x = \frac{\pi}{3}, \frac{5\pi}{3}, \pi}$$

③ Solve $\sin x \cot x - \sqrt{3} \sin x = 0$ $\quad -2\pi < x < 2\pi$

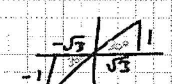
$\sin x(\cot x - \sqrt{3}) = 0$

$\cancel{\sin x = 0}$ $\quad \cot x = \frac{\cos x}{\sin x}$ $\quad \cot x = \sqrt{3}$

$\sin x \neq 0$



$x = 0, \pi, -\pi$



$x = \frac{\pi}{6}, \frac{7\pi}{6}, -\frac{5\pi}{6}, -\frac{11\pi}{6}$

$$\boxed{x = \frac{\pi}{6}, \frac{7\pi}{6}, -\frac{5\pi}{6}, -\frac{11\pi}{6}}$$

③ Solve $\sin 2\theta - 2\sin^2\theta = 0$ $\quad -\pi \le \theta \le \pi$

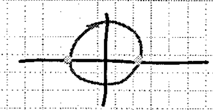
$2\sin\theta\cos\theta - 2\sin^2\theta = 0$

$2\sin\theta(\cos\theta - \sin\theta) = 0$

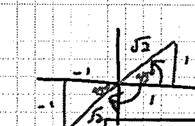
$2\sin\theta = 0$ $\quad \cos\theta - \sin\theta = 0$

$\sin\theta = 0$ $\quad \cos\theta = \sin\theta$

↳ When does $\cos\theta = \sin\theta$?



$\theta = 0, \pi, -\pi$



$\theta = \frac{\pi}{4}, -\frac{3\pi}{4}$

$$\boxed{\theta = 0, \pi, -\pi, \frac{\pi}{4}, -\frac{3\pi}{4}}$$

(5) Prove a) $\cos 2x = \dfrac{\cot x - \tan x}{\cot x + \tan x}$

$\cos^2 x - \sin^2 x$

$$\frac{\frac{\cos x}{\sin x} - \frac{\sin x}{\cos x}}{\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}}$$

$$\frac{\frac{\cos^2 x - \sin^2 x}{\sin x \cos x}}{\frac{\cos^2 x + \sin^2 x}{\sin x \cos x}} = \frac{\cos^2 x - \sin^2 x}{\cancel{\sin x \cos x}} \cdot \frac{\cancel{\sin x \cos x}}{\cos^2 x + \sin^2 x}$$

$$\frac{\cos^2 x - \sin^2 x}{1}$$

$\cos^2 x - \sin^2 x$

L.S. = R.S

b) $\dfrac{\cos 2\theta - \cos\theta}{\sin 2\theta + \sin\theta} = \dfrac{1 - \sec\theta}{\tan\theta}$

$$\frac{2\cos^2\theta - \cos\theta - 1}{2\sin\theta\cos\theta + \sin\theta}$$

$$\frac{\cancel{(2\cos\theta + 1)}(\cos\theta - 1)}{\sin\theta\,\cancel{(2\cos\theta + 1)}}$$

$$\frac{\cos\theta - 1}{\sin\theta}$$

$$\frac{\frac{\cos\theta}{\cos\theta} - \frac{1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta}} \qquad \frac{\frac{\cos\theta - 1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta}}$$

$$\frac{\cos\theta - 1}{\sin\theta}$$

L.S. = R.S.

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* 1-48
NOT 15,16

c) $\dfrac{\sec^2\theta}{\sec^2\theta - 1} = \csc^2\theta$

$$\frac{\frac{1}{\cos^2\theta}}{\tan^2\theta}$$

$$\frac{\frac{1}{\cancel{\cos^2\theta}}}{\frac{\sin^2\theta}{\cancel{\cos^2\theta}}}$$

$$\frac{1}{\sin^2\theta}$$

$\csc^2\theta$

L.S. = R.S.

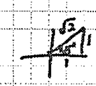
(4) Write as a single trig function and determine the exact value

a) $2\cos^2\frac{\pi}{8} - 2\sin^2\frac{\pi}{8}$

$2\left(\cos^2\frac{\pi}{8} - \sin^2\frac{\pi}{8}\right)$

$2\cos 2\left(\frac{\pi}{8}\right)$

$\boxed{2\cos\frac{\pi}{4}}$



$2\left(\frac{1}{\sqrt{2}}\right) = \boxed{\frac{2}{\sqrt{2}} \text{ or } \sqrt{2}}$

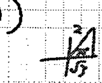
b) $4 - 8\cos^2 15°$

$4(1 - 2\cos^2 15°)$

$-4(2\cos^2 15° - 1)$

$-4(\cos 2(15°))$

$\boxed{-4\cos 30°}$

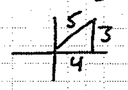


$-4\left(\frac{\sqrt{3}}{2}\right) = \boxed{-2\sqrt{3}}$

⑥ Given that $\sin P = \frac{3}{5}$ and $\cos Q = -\frac{5}{13}$ where $0 \le P \le \frac{\pi}{2}$ and $\frac{\pi}{2} \le Q \le \pi$, determine $\cos(P+Q)$.

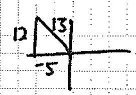
$$\cos(P+Q) = \cos P \cos Q - \sin P \sin Q$$
$$= \cos P\left(\frac{-5}{13}\right) - \left(\frac{3}{5}\right)\sin Q$$

$\sin P = \frac{3}{5}$



$\cos P = \frac{4}{5}$

$\cos Q = -\frac{5}{13}$



$\sin Q = \frac{12}{13}$

$$\left(\frac{4}{5}\right)\left(\frac{-5}{13}\right) - \left(\frac{3}{5}\right)\left(\frac{12}{13}\right)$$

$$\frac{-20}{65} - \frac{36}{65}$$

$$\boxed{-\frac{56}{65}}$$

⑧ Which of the following expressions are equivalent to $\cos^4\theta - \sin^4\theta$?

A. $(\cos 2\theta)^2$

B. $\cos 4\theta$

C. $-\cos 2\theta$

D. $\cos 2\theta$

$$(\cos^2\theta - \sin^2\theta)(\cos^2\theta + \sin^2\theta)$$

$$(\cos 2\theta)(1)$$

D. $\boxed{\cos 2\theta}$

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1-48

NOT 15, 16, 28