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QUIZ 6.1 – 6.2

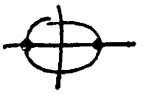
1. Determine the non-permissible values of x, in radians, for each expression.

a) $\frac{sinx}{cosx}$ • $\cos x \neq 0$

$x \neq \frac{\pi}{2} + n\pi, n \in I$

1

b) $\frac{cosx}{tanx}$ • $\cos x \neq 0$ • $\sin x \neq 0$

$x \neq 0 + n\frac{\pi}{2}, n \in I$

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c) $\frac{cotx}{1+sinx}$ • $\sin x \neq 0$ • $\sin x \neq -1$


$x \neq 0 + n\pi, n \in I$
$x \neq -\frac{\pi}{2} + 2n\pi, n \in I$

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2. Simplify each expressions to one of the 3 primary trigonometric functions, sinx, cosx, or tanx (without finding the non-permissible values).

a) $cotx.sinx = \frac{\cos x}{\sin x} \cdot \sin x = \cos x$

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b) $\frac{sec^2x.cosx}{cscx} = \frac{\frac{1}{\cos^2 x} \cdot \cos x}{\frac{1}{\sin x}} = \frac{\frac{1}{\cos x}}{\frac{1}{\sin x}} = \frac{1}{\cos x} \times \frac{\sin x}{1} = \tan x$

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c) $\frac{cotx.tanx}{cscx} = \frac{\frac{\cos x}{\sin x} \cdot \frac{\sin x}{\cos x}}{\frac{1}{\sin x}} = \sin x$

2

d) $\csc x - \frac{\cot x}{\sec x} = \frac{1}{\sin x} - \frac{\frac{\cos x}{\sin x}}{\frac{1}{\cos x}} = \frac{1}{\sin x} - \frac{\cos^2 x}{\sin x}$

2

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

3. Verify that the equation $\frac{\csc x}{\tan x + \cot x} = \cos x$ is true for $x = 60°$ and for $x = \frac{\pi}{6}$.

$x = 60°$ L.S. $\frac{\csc 60}{\tan 60 + \cot 60} = \frac{\frac{2}{\sqrt{3}}}{\sqrt{3} + \frac{1}{\sqrt{3}}} = \frac{\frac{2}{\sqrt{3}}}{\frac{4}{\sqrt{3}}} = \frac{1}{2}$ R.S: $\cos 60 = \frac{1}{2}$ ✓

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$x = \frac{\pi}{6}$ L.S: $\frac{\csc \frac{\pi}{6}}{\tan \frac{\pi}{6} + \cot \frac{\pi}{6}} = \frac{2}{\frac{1}{\sqrt{3}} + \sqrt{3}} = \frac{2}{\frac{4}{\sqrt{3}}} = \frac{\sqrt{3}}{2}$ R.S: $\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$ ✓

2

4. Determine the restrictions, and prove the following identity :

$$\tan x + \frac{1}{\tan x} = \frac{1}{\cos x . \sin x}$$

1 • restrictions : • $\sin x \neq 0$ • $\cos x \neq 0$ $\boxed{x \neq 0 + n\frac{\pi}{2},\ n \in I}$

• L.S: $\tan x + \frac{1}{\tan x} = \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}$

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

2 $= \frac{1}{\cos x . \sin x}$ R.S ✓

5. Write each expression as a single trigonometric function :

a) $sin72°.cos46° - cos72°.sin46°$ $= \sin(72° - 46°)$

$= \boxed{\sin 26°}$

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b) $\frac{tan28°+tan33°}{1-tan28°.tan33°}$ $= \tan(28° + 33°)$

$= \boxed{\tan 61°}$

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c) $1 - 2sin^2\frac{\pi}{8}$ $= \cos\left(2 \times \frac{\pi}{8}\right)$

$= \boxed{\cos\frac{\pi}{4}} = \frac{1}{\sqrt{2}}$

2

d) $\frac{cos2x-1}{sin2x}$ $= \frac{1 - 2\sin^2 x - 1}{2\sin x.\cos x}$

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

$= \boxed{-\tan x}$

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e) $8sin^2 2\theta - 4$ $= 4(2\sin^2 2\theta - 1)$

$= \boxed{-4 \times \cos 4\theta}$

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6. Give the exact value for each expression :

a) $\frac{2\tan\frac{\pi}{3}}{1-\tan^2\frac{2\pi}{3}} = \frac{2\sqrt{3}}{1-\sqrt{3}^2} = \frac{2\sqrt{3}}{-2} = \boxed{-\sqrt{3}}$ or $\tan\frac{2\pi}{3}$ ...

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b) $\cos\frac{\pi}{3}.\cos\frac{\pi}{12} + \sin\frac{\pi}{3}.\sin\frac{\pi}{12} = \cos\left(\frac{\pi}{3} - \frac{\pi}{12}\right)$

$= \cos\frac{3\pi}{12}$

$= \cos\frac{\pi}{4} = \boxed{\frac{1}{\sqrt{2}}}$

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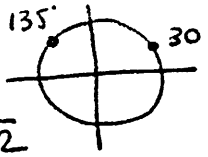
c) $\sin 105° = \sin(135° - 30°)$

$= \sin 135°.\cos 30° - \cos 135°.\sin 30°$

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



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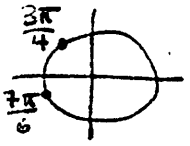
d) $\tan\frac{23\pi}{12} = \tan\left(\frac{7\pi}{6} + \frac{3\pi}{4}\right)$

$= \frac{\tan\frac{7\pi}{6} + \tan\frac{3\pi}{4}}{1 - \tan\frac{7\pi}{6}.\tan\frac{3\pi}{4}}$

$= \frac{\frac{1}{\sqrt{3}} + (-1)}{1 - \frac{1}{\sqrt{3}}\times(-1)} = \frac{\frac{1-\sqrt{3}}{\sqrt{3}}}{1+\frac{1}{\sqrt{3}}} = \frac{1-\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}+1} = \boxed{\frac{1-\sqrt{3}}{\sqrt{3}+1}} = \sqrt{3}-2$



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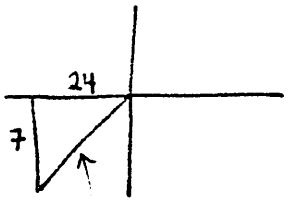
7. Angle θ is in quadrant III and $\tan\theta = \frac{7}{24}$. Determine an exact value for $\sin 2\theta$.



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(Pythagorean Th.)

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

$= 2\times\left(-\frac{7}{25}\right)\times\left(-\frac{24}{25}\right)$

$= \boxed{\frac{336}{625}}$

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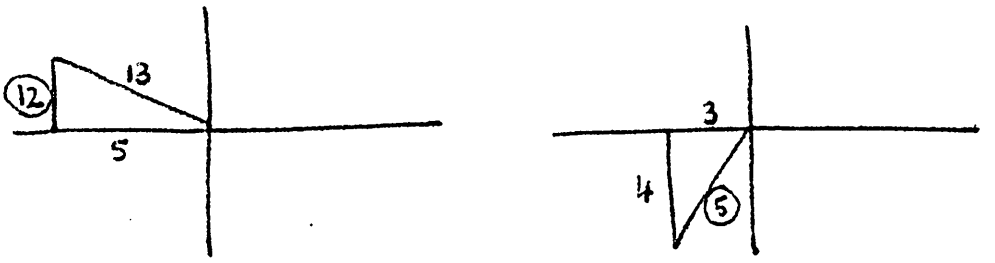
8. Angle x is in quadrant II, angle y is in quadrant III, $cosx = -\frac{5}{13}$, and $tany = \frac{4}{3}$. Determine the value of $cos(x - y)$.



$$\cos(x-y) = \cos x \cdot \cos y + \sin x \cdot \sin y$$

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

$$= \boxed{-\frac{33}{65}}$$

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