**Author: Akuoma Duru**

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10.3 (By Akuoma Duru)

① a) $2\sin^2\theta - (1 - \cos^2\theta) + \cos^2\theta$

$(1 - \cos^2\theta) = \sin^2\theta$

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

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

b) $6\sin^2\frac{\theta}{2} + 6\cos^2\frac{\theta}{2} = 6(\sin^2\theta + \cos^2\theta) = 6$

c) $(1+\cos x)^2 + (1 - \cos x)^2 + 2\sin x$

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

$2\cos^2 x + 2 + 2\sin^2 x = 2 + 2 = 4$

~~$2 + 2\sin^2 x + 2\sin x$~~

② a) $2\frac{\sin x}{\cos x} = 2 \times \tan x = 2\tan x$

b) $\frac{3\sin x}{\sqrt{1 - \sin^2 x}}$

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

$3\frac{\sin x}{\cos x} = 3\tan x$

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

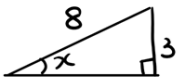
$\frac{\sin^2 x}{\cos^2 x} = \tan^2 x$

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

$1 - \sin^2 x = \cos^2 x$

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

(4) $\sin x = \frac{3}{8} \Rightarrow$




$\hookrightarrow \sqrt{8^2 - 3^2} = \sqrt{55}$

$\Rightarrow \cos x = -\frac{\sqrt{55}}{8}$ (both negative because $x$ is obtuse when $90° < x < 180°$, Cos and tan are negative)

$\tan x = -\frac{3}{\sqrt{55}} = \frac{-3\sqrt{55}}{55}$

(5) a) $\sin\theta = 6\cos\theta$

$\frac{\sin\theta}{\cos\theta} = 6$

$\tan\theta = 6$

b) $4\cos^2\theta - 5\sin^2\theta$

$4 - 4\sin^2\theta - 5\sin^2\theta$

$4 - 9\sin^2\theta$

(6) $4\cos^2 x - 3\sin^2 x = 2$

$3\sin^2 x \rightarrow 3 - 3\cos^2 x$

$4\cos^2 x - 3 + 3\cos^2 x = 2$

$7\cos^2 x - 3 = 2$

$7\cos^2 x = 5$

⑦

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

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

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

8a)

$(AC)^2 = (AB)^2 + (BC)^2 - 2(AB)(BC)\cos B$

$9^2 = 7^2 + 12^2 - 2(7)(12)\cos B$

$81 = 193 - 168\cos B$

$168\cos B = 112$

$\cos B = \frac{112}{168} = \frac{2}{3}$

8b) $\sin^2\theta + \cos^2\theta = 1$

$\sin^2 B = 1 - \cos^2 B$

$\sin B = \sqrt{1 - \cos^2 B}$

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

$= \frac{\sqrt{5}}{3}$

9a) $\frac{\sin P}{QR} = \frac{\sin \angle PQR}{PR}$

$\frac{\sin P}{10} = \frac{\sin 45^\circ}{9}$

$\sin P = \frac{\sin 45^\circ}{9} \times 10 = \frac{5\sqrt{2}}{9}$

9b) $\cos^2 P = 1 - \sin^2 P$

$\cos^2 P = 1 - \left(\frac{5\sqrt{2}}{9}\right)^2$

$\cos^2 P = \frac{31}{81}$

$\cos P = \pm \frac{\sqrt{31}}{9}$

$\cos P = -\frac{\sqrt{31}}{9}$ ($\because \cos P$ is negative when P is obtuse)