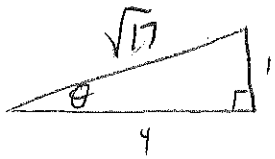


855 p. 415 # 3, 5, 9, 13, 19, 21, 29, 27, 35, 37, 41, 42, 50, 53, 55



$$\begin{aligned} \textcircled{3} \cos 2\theta &= \cos^2 \theta - \sin^2 \theta \\ &= \left(\frac{4}{\sqrt{17}}\right)^2 - \left(\frac{1}{\sqrt{17}}\right)^2 = \frac{16}{17} - \frac{1}{17} = \frac{15}{17} \end{aligned}$$

$$\textcircled{5} \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta} = \frac{2\left(\frac{1}{4}\right)}{1 - \left(\frac{1}{4}\right)^2} = \frac{\frac{1}{2}}{1 - \frac{1}{16}} = \frac{\frac{1}{2}}{\frac{15}{16}} = \frac{1}{2} \cdot \frac{16}{15} = \frac{8}{15}$$

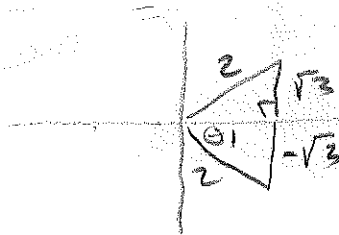
$$\textcircled{9} \sin 2x - \sin x = 0$$

$$2 \sin x \cos x - \sin x = 0$$

$$\sin x (2 \cos x - 1) = 0$$

$$\sin x = 0 \quad \cos x = \frac{1}{2}$$

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



$$\textcircled{13} \cos 2x - \cos x = 0$$

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

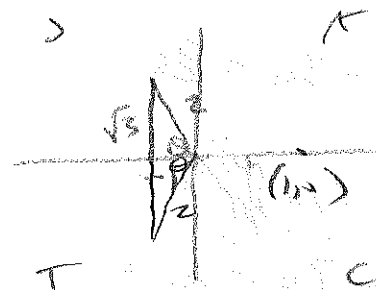
$$2 \cos^2 x - \cos x - 1 = 0$$

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

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

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

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



$$\textcircled{19} 6 \sin x \cos x = 2(2 \sin x \cos x)$$

$$= 3 \sin 2x$$

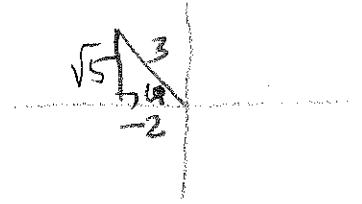
$$\textcircled{21} \quad 4 - 8\sin^2 x = 4(1 - 2\sin^2 x)$$

$$= 4(\cos 2x)$$

$$\textcircled{24} \quad \cos u = -\frac{2}{3}, \quad \frac{\pi}{2} < u < \pi$$

$$\sin 2u = 2\sin u \cos u = 2\left(\frac{\sqrt{5}}{3}\right)\left(-\frac{2}{3}\right)$$

$$= \frac{4\sqrt{5}}{9}$$



$$\cos 2u = \cos^2 u - \sin^2 u = \left(-\frac{2}{3}\right)^2 - \left(\frac{\sqrt{5}}{3}\right)^2$$

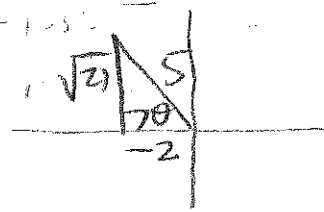
$$= \frac{4}{9} - \frac{5}{9} = \frac{-1}{9}$$

$$\tan 2u = \frac{2\tan u}{1 - \tan^2 u} = \frac{2\left(-\frac{\sqrt{5}}{2}\right)}{1 - \left(\frac{\sqrt{5}}{2}\right)^2} = \frac{-\sqrt{5}}{1 - \frac{5}{4}} = \frac{-\sqrt{5}}{-\frac{1}{4}} = 4\sqrt{5}$$

$$\textcircled{27} \quad \sec u = -\frac{5}{2}, \quad \frac{\pi}{2} < u < \pi$$

$$\sin 2u = 2\sin u \cos u = 2\left(\frac{\sqrt{21}}{5}\right)\left(-\frac{3}{5}\right)$$

$$= \frac{-4\sqrt{21}}{25}$$



$$\cos 2u = \cos^2 u - \sin^2 u = \left(-\frac{3}{5}\right)^2 - \left(\frac{\sqrt{21}}{5}\right)^2 = \frac{9}{25} - \frac{21}{25} = \frac{-12}{25}$$

$$\tan 2u = \frac{2\tan u}{1 - \tan^2 u} = \frac{2\left(-\frac{\sqrt{21}}{3}\right)}{1 - \left(-\frac{\sqrt{21}}{3}\right)^2} = \frac{-\frac{2\sqrt{21}}{3}}{1 - \frac{7}{3}} = \frac{-\frac{2\sqrt{21}}{3}}{-\frac{4}{3}} = \frac{4\sqrt{21}}{17}$$

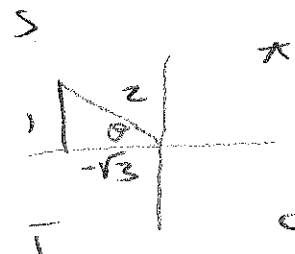
$$\textcircled{35} \quad \cos \frac{\theta}{2} = \pm \sqrt{\frac{1 + \cos \theta}{2}} = \pm \sqrt{\frac{1 + \frac{15}{17}}{2}} = \pm \sqrt{\frac{\frac{32}{17}}{2}}$$

$$= \pm \sqrt{\frac{32}{34}} = \pm \sqrt{\frac{16}{17}} = \pm \frac{4}{\sqrt{17}} = \pm \frac{4\sqrt{17}}{17}$$

$$(37) \tan \frac{\theta}{2} = \frac{1 - \cos \theta}{\sin \theta} = \frac{1 - \frac{15}{17}}{\frac{8}{17}} = \frac{\frac{2}{17}}{\frac{8}{17}} = \frac{2}{17} \cdot \frac{17}{8} = \frac{1}{4}$$

$$(41) 75^\circ$$

$$\sin\left(\frac{150}{2}\right) = \sqrt{\frac{1 - \cos 150}{2}} = \sqrt{\frac{1 - \frac{-\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{2 + \sqrt{3}}{2}}{2}} = \sqrt{\frac{2 + \sqrt{3}}{4}} = \frac{\sqrt{2 + \sqrt{3}}}{2}$$

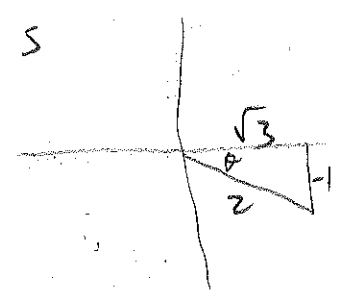


$$\cos\left(\frac{150}{2}\right) = + \sqrt{\frac{1 + \cos 150}{2}} = + \sqrt{\frac{1 + \frac{-\sqrt{3}}{2}}{2}} = + \sqrt{\frac{\frac{2 - \sqrt{3}}{2}}{2}} = \frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$\tan\left(\frac{150}{2}\right) = \frac{1 - \cos \theta}{\sin \theta} = \frac{1 - \frac{-\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\frac{2 + \sqrt{3}}{2}}{\frac{1}{2}} = 2 + \sqrt{3}$$

$$(42) 165^\circ$$

$$\sin\left(\frac{330}{2}\right) = \sqrt{\frac{1 - \cos 330}{2}} = \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{\frac{2 - \sqrt{3}}{2}}{2}} = \frac{\sqrt{2 - \sqrt{3}}}{2}$$



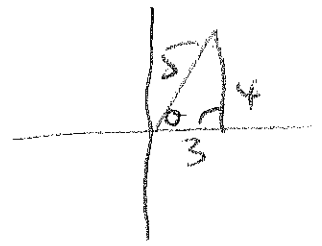
$$\cos\left(\frac{330}{2}\right) = - \sqrt{\frac{1 + \cos 330}{2}} = - \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}} = - \sqrt{\frac{\frac{2 + \sqrt{3}}{2}}{2}} = - \frac{\sqrt{2 + \sqrt{3}}}{2}$$

$$\tan\left(\frac{330}{2}\right) = \left(\frac{1 - \cos \theta}{\sin \theta}\right) = \left(\frac{1 - \frac{\sqrt{3}}{2}}{-\frac{1}{2}}\right) \left(\frac{\frac{2 - \sqrt{3}}{2}}{-\frac{1}{2}}\right) = -(2 - \sqrt{3})$$

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

(50)

$$\cos u = \frac{3}{5}, \quad 0 < u < \frac{\pi}{2}$$



$$\sin \frac{u}{2} = + \sqrt{\frac{1 - \cos u}{2}} = \sqrt{\frac{1 - \frac{3}{5}}{2}}$$

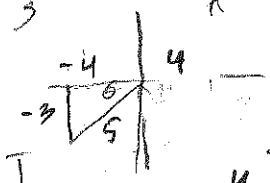
$$= \sqrt{\frac{\frac{2}{5}}{2}} = \sqrt{\frac{2}{10}} = \sqrt{\frac{1}{5}} = \frac{\sqrt{5}}{5}$$

$$\cos \frac{u}{2} = \sqrt{\frac{1 + \cos u}{2}} = \sqrt{\frac{1 + \frac{3}{5}}{2}} = \sqrt{\frac{\frac{8}{5}}{2}} = \sqrt{\frac{8}{10}} = \sqrt{\frac{4}{5}} = \frac{2}{\sqrt{5}}$$

$$\tan \frac{u}{2} = \frac{1 - \cos u}{\sin u} = \frac{1 - \frac{3}{5}}{\frac{4}{5}} = \frac{\frac{2}{5}}{\frac{4}{5}} = \frac{2}{5} \cdot \frac{5}{4} = \frac{1}{2}$$

* (53) $\csc u = -\frac{5}{3}$ $\pi < u < \frac{3\pi}{2}$

$\therefore \sin = -\frac{3}{5}$



$$\sin \frac{u}{2} = \sqrt{\frac{1 - \cos u}{2}} = \sqrt{\frac{1 + \frac{4}{5}}{2}} = \sqrt{\frac{\frac{9}{5}}{2}} = \sqrt{\frac{9}{10}} = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10}$$

$$\cos \frac{u}{2} = -\sqrt{\frac{1 + \cos u}{2}} = -\sqrt{\frac{1 - \frac{3}{5}}{2}} = -\sqrt{\frac{\frac{2}{5}}{2}} = -\sqrt{\frac{1}{5}} = -\frac{1}{\sqrt{5}} = -\frac{\sqrt{10}}{10}$$

$$\tan \frac{u}{2} = \frac{1 - \cos u}{\sin u} = \frac{1 - \frac{-4}{5}}{-\frac{3}{5}} = \frac{\frac{9}{5}}{-\frac{3}{5}} = -\frac{9}{5} \cdot \frac{5}{3} = -3$$

(55)

$$\sqrt{\frac{1 - \cos 6x}{2}} = \left| \sin \frac{6x}{2} \right| = |\sin 3x|$$