27. $\sin x + \cos x = \dfrac{\cos x}{1 - \tan x} + \dfrac{\sin x}{1 - \cot x}$

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

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

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

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

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

$$\sin x + \cos x = \sin x + \cos x$$

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

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

3 35. If $\frac{\tan^3\theta - 1}{\tan\theta - 1} - \sec^2\theta - 1 = 0$, find $\cot\theta$. $x - 2 = 0$

$1 - \sin^2 x + 2\sin x - 2 = 0$

$-1(-\sin^2 x + 2\sin x - 1 = 0)$

$\sin^2 x - 2\sin x + 1 = 0$

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

$\sin x - 1 = 0$

$\sin x = 1$

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

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

$(x - 1)(x - 1)$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$x^3 - y^3$

35. If $\frac{\tan^3\theta - 1}{\tan\theta - 1} - \sec^2\theta - 1 = 0,$

$a = \tan\theta$

$b = 1$

$\frac{(\cancel{\tan\theta - 1})(\tan^2\theta + \tan\theta + 1)}{\cancel{\tan\theta - 1}} - \sec^2\theta - 1 = 0$

$\tan^2\theta + \tan\theta + 1 - \sec^2\theta - 1 = 0$

$\tan^2\theta + \tan\theta + 1 - (\tan^2\theta + 1) - 1 = 0$

$\cancel{\tan^2\theta} + \tan\theta + 1 - \cancel{\tan^2\theta} - 1 - 1 = 0$

$\tan\theta - 1 = 0$

$\tan\theta = 1$

$\cot\theta = 1$

25, 31 Section 7.2

$\cos 735°$. $= \cos 375° = \cos 15°$

$$\begin{array}{r} 735 \\ -360 \\ \hline 375 \\ -360 \\ \hline 15 \end{array}$$

$$\cos 375 = \cos(\underset{\alpha}{330} + \underset{\beta}{45}) = \cos 330° \cos 45° - \sin 330° \sin 45°$$

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

$$= \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$$

$$= \frac{\sqrt{6}+\sqrt{2}}{4}$$