8. If $\cos^2 x + 2\sin x - 2 = 0$, find the exact value of $\sin x$

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

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

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

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

$$\sin x - 1 = 0$$

$$\sin x = 1$$

---

5. $\cos A \tan^2 A + \cos A.$

$$\cancel{\cos A}\,\frac{\sin^2 A}{\cos^{\cancel{2}} A} + \cos A$$

$$\frac{\sin^2 A}{\cos A} + \frac{\cos A}{1}\cdot\frac{\cos A}{\cos A}$$

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

$$\frac{1}{\cos A}$$

$$\sec A$$

$$\cos A(\sec^2 A - 1) + \cos A$$

$$\cos A\left(\frac{1}{\cos^2 A} - 1\right) + \cos A$$

$$\frac{1}{\cos A} - \cos A + \cos A$$

$$\frac{1}{\cos A}$$

$$\sec A$$

2. If $\cos\theta = -\frac{4}{5}$ and $180^\circ < \theta < 270^\circ$, find $\tan\theta$.

$\sec\theta = -\frac{5}{4}$

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

$\tan^2\theta + 1 - 1 = \frac{25}{16} - \cancel{1}\,\frac{16}{16}$

$\tan^2\theta = \frac{9}{16}$

$\tan\theta = \frac{3}{4}$

13. Use a sum or difference identity to simplify:

$\sin(\pi + A) = \sin\pi\cos A + \cos\pi\sin A$

$(0)\cancel{\cos A} + (-1)\sin A$

$-\sin A$

12. 11. Find the exact value of $\cos(x + y)$ if $\sin x = \frac{8}{17}$, $\cos y = \frac{7}{25}$, x and y have their terminal sides in the first quadrant.

$$\cos(x+y) = \cos x \cos y - \sin x \sin y$$
$$= \left(\frac{15}{17}\right)\left(\frac{7}{25}\right) - \left(\frac{8}{17}\right)\left(\frac{24}{25}\right)$$
$$= \frac{105}{425} - \frac{192}{425}$$
$$= \frac{-87}{425}$$

$$\left(\frac{8}{17}\right)^2 + \cos^2 x = 1$$
$$\cos^2 x = \frac{225}{289}$$
$$\cos x = \frac{15}{17}$$

$$\sin^2 y + \left(\frac{7}{25}\right)^2 = 1$$
$$\sin^2 y = \frac{576}{625}$$
$$\sin y = \frac{24}{25}$$

26. $\frac{\cot A}{\tan A} = \cot^2 A$

$$\frac{\cot A}{\frac{1}{\cot A}} =$$

$$\cot A \cdot \frac{\cot A}{1} =$$

$$\cot^2 A = \cot^2 A$$

30. $\cos 2x + 2\sin^2 x = 1$

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

$1 = 1$

18. $\sin x = \frac{3}{5}, 0 < x < \frac{\pi}{2}$

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

$= 2\left(\frac{3}{5}\right)\left(\frac{4}{5}\right)$

$\sin 2x = \frac{24}{25}$

$\left(\frac{3}{5}\right)^2 + \cos^2 x = 1$

$\cos^2 x = \frac{16}{25}$

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

$\cos 2x = \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)$

$= \frac{16}{25} - \frac{9}{25}$

$\cos 2x = \frac{7}{25}$

$\tan x = \frac{\frac{3}{5}}{\frac{4}{5}} = \frac{3}{\cancel{5}} \cdot \frac{\cancel{5}}{4}$

$= \frac{3}{4}$

$\tan 2x = \frac{2\tan x}{1 - \tan^2 x} = \frac{2\left(\frac{3}{4}\right)}{1 - \left(\frac{3}{4}\right)^2} = \frac{\frac{6}{4}}{\frac{7}{16}}$

$\frac{9}{16}$

$= \frac{6}{\cancel{4}_1} \cdot \frac{\cancel{16}^4}{7}$

$\tan 2x = \frac{24}{7}$

17. $\tan x = \frac{1}{2}, \pi < x < \frac{3\pi}{2}$

$$\tan 2x = \frac{2\left(\frac{1}{2}\right)}{1-\left(\frac{1}{2}\right)^2} = \frac{1}{\frac{3}{4}} = \frac{4}{3}$$

$\frac{1}{4}$

$$\left(\frac{1}{2}\right)^2 + 1 = \sec^2 x$$

$$\frac{5}{4} = \sec^2 x$$

$$-\frac{\sqrt{5}}{2} = \sec x$$

$$\frac{-2\sqrt{5}}{5} = -\frac{2}{\sqrt{5}} = \cos x$$

$$\sin^2 x + \left(\frac{-2\sqrt{5}}{5}\right)^2 = 1$$

$-\frac{4}{5}$ $-\frac{4}{5}$

$$\sin^2 x = \frac{1}{5}$$

$$\sin x = -\frac{1}{\sqrt{5}} = \frac{-\sqrt{5}}{5}$$

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

$$= 2\left(-\frac{\sqrt{5}}{5}\right)\left(-\frac{2\sqrt{5}}{5}\right)$$

$$\sin 2x = \frac{20}{25} = \frac{4}{5}$$

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

$$= 2\left(\frac{20}{25}\right) - 1$$

4 5

$$= \frac{8}{5} - 1$$

$$\cos 2x = \frac{3}{5}$$

(23) $\sec^2 x + \tan x - 1 = 0$

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

$\tan^2 x + \tan x = 0$

$\tan x(\tan x + 1) = 0$

$\tan x = 0 \qquad \tan x + 1 = 0$

$x = 0°, 180° \qquad \tan x = -1$

$0, \pi \qquad x = 135°, 315°$

$\frac{3\pi}{4}, \frac{7\pi}{4}$

$$\left.\begin{array}{l} x = \pi k \\ x = \frac{3\pi}{4} + \pi k \end{array}\right\} k = \text{int.}$$

---

(24) $2x - 5y = -4 \qquad (2, 3)$

$2x - 5y + 4 = 0$

$A \quad B \quad C$

$$d = \left|\frac{2(2) - 5(3) + 4}{\sqrt{2^2 + (-5)^2}}\right| = \left|\frac{-7}{\sqrt{29}}\right| = \frac{7}{\sqrt{29}} = \frac{7\sqrt{29}}{29}$$