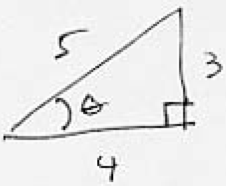
4. Find the exact value of $\sin\left(\underbrace{2\cos^{-1}\frac{4}{5}}_{\theta}\right)$. w/o a calculator.

$$= 2\sin\left(\underbrace{\cos^{-1}\left(\frac{4}{5}\right)}_{\theta}\right)\underbrace{\cos\left(\cos^{-1}\left(4/5\right)\right)}_{4/5}$$



$$= 2\left(\frac{3}{5}\right)\left(\frac{4}{5}\right) = \frac{24}{25}$$

5. Evaluate $\cos 97.5^\circ \sin 37.5^\circ$ exactly, using the appropriate identity.

$$\underbrace{\cos(60^\circ + 37.5^\circ)}\sin(37.5^\circ)$$

$$\underbrace{\cos(60^\circ)}_{\frac{1}{2}}\cos(37.5^\circ)\sin(37.5^\circ) - \underbrace{\sin(60^\circ)}_{\sqrt{3}/2}\sin^2(37.5^\circ)$$

$$\cancel{\frac{1}{2}\cos(37.5^\circ) - \frac{\sqrt{3}}{2}(1-\cos^2(37.5^\circ))}$$

$$\frac{1}{2}\cos(37.5^\circ)\sin(37.5^\circ) - \frac{\sqrt{3}}{2}(1-\cos^2(37.5^\circ))$$

$$\frac{1}{2}\left[\sin(135^\circ) - \sin(60^\circ)\right]$$

6. Find all solutions x, for $\cos^2 x + 2\sin x = -2$.

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

$$\sin^2 x - 2\sin x - 3 = 0$$

$$\sin x = \frac{2 \pm \sqrt{4 - 4(1)(-3)}}{2}$$

$$\sin x = \frac{2 \pm \sqrt{16}}{2} = \frac{2 \pm 4}{2} = \frac{6}{2}$$

or -1.

$$x = \frac{3\pi}{2} + 2k\pi,\ k \in \mathbb{Z}.$$