Solve each equation over the interval $[0, 2\pi)$.

1) $2\cos\theta + 4 = 5$

   $2\cos\theta = 1$

   $\cos\theta = \dfrac{1}{2}$

   $\theta = \left\{\dfrac{\pi}{3}, \dfrac{5\pi}{3}\right\}$

2) $2\sin\theta - 1 = 0$

   $2\sin\theta = 1$

   $\sin\theta = \dfrac{1}{2}$

   $\theta = \left\{\dfrac{\pi}{6}, \dfrac{5\pi}{6}\right\}$

3) $\tan^2\theta - 3 = 0$

   $\tan^2\theta = 3$

   $\tan\theta = \pm\sqrt{3}$

   $\theta = \left\{\dfrac{\pi}{3}, \dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \dfrac{5\pi}{3}\right\}$

4) $5\cos\theta - \sqrt{3} = 3\cos\theta$

   $2\cos\theta = \sqrt{3}$

   $\cos\theta = \dfrac{\sqrt{3}}{2}$

   $\theta = \left\{\dfrac{\pi}{6}, \dfrac{11\pi}{6}\right\}$

5) $4\sec^2\theta - 2 = 0$

   $4\sec^2\theta = 2$

   $\sec^2\theta = \dfrac{1}{2}$
   $\cos^2\theta = 2$

   $\cos\theta = \pm\sqrt{2}$

   $\theta = \emptyset$

6) $\sin^2\theta - 5\cos\theta = 5$

   $(1 - \cos^2\theta) - 5\cos\theta = 5$

   $\cos^2\theta + 5\cos\theta + 4 = 0$

   $(\cos\theta + 1)(\cos\theta + 4) = 0$

   $\cos\theta = -1, \qquad \cos\theta = -4$

   $\theta = \pi$

7) $4\sin^2\theta - 2 = 0$

   $4\sin^2\theta = 2$

   $\sin^2\theta = \dfrac{1}{2}$

   $\sin\theta = \pm\dfrac{\sqrt{2}}{2}$

   $\theta = \left\{\dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}\right\}$

8) $3\tan\theta - \sqrt{3} = 0$

   $3\tan\theta = \sqrt{3}$

   $\tan\theta = \dfrac{\sqrt{3}}{3}$

   $\theta = \left\{\dfrac{\pi}{6}, \dfrac{7\pi}{6}\right\}$

9) $\sec(\theta) + 2 = 0$

$\sec(\theta) = -2$

$\cos(\theta) = -\dfrac{1}{2}$

$\theta = \left\{\dfrac{2\pi}{3}, \dfrac{4\pi}{3}\right\}$

10) $\sin^2\theta - 4\sin\theta = 5$

$\sin^2\theta - 4\sin\theta - 5 = 0$

$(\sin\theta - 5)(\sin\theta + 1) = 0$

$\sin\theta = 5, \qquad \sin\theta = -1$

$\theta = \dfrac{3\pi}{2}$

11) $\cot\theta\sec\theta + \cot\theta = 0$

$\dfrac{\cos\theta}{\sin\theta}\dfrac{1}{\cos\theta} + \dfrac{\cos\theta}{\sin\theta} = 0$

$\dfrac{1}{\sin\theta} + \dfrac{\cos\theta}{\sin\theta} = 0$

$\dfrac{1 + \cos\theta}{\sin\theta} = 0$

$1 + \cos\theta = 0$

$\cos\theta = -1$

$\theta = \pi$

Fails to check: $\theta = \varnothing$

12) $5\cos 2\theta + 1 = 3\cos 2\theta$

$2\cos 2\theta = -1$

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

$4\cos^2\theta - 2 = -1$

$\cos^2\theta = \dfrac{1}{4}$

$\cos\theta = \pm\dfrac{1}{2}$

$\theta = \left\{\dfrac{\pi}{3}, \dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \dfrac{5\pi}{3}\right\}$

Solve each equation over the interval $(-2\pi, 2\pi)$:

13) $16\cos^2\theta - 8 = 0$

$\cos^2\theta = \dfrac{1}{2}$

$\cos\theta = \pm\dfrac{\sqrt{2}}{2}$

$\theta = \left\{-\dfrac{7\pi}{4}, -\dfrac{5\pi}{4}, -\dfrac{3\pi}{4}, -\dfrac{\pi}{4}, \dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}\right\}$

14) $2\cos^2\theta - 3\cos\theta + 1 = 0$

$(2\cos\theta - 1)(\cos\theta - 1) = 0$

$2\cos\theta - 1 = 0, \qquad \cos\theta - 1 = 0$

$\cos\theta = \dfrac{1}{2}, \qquad \cos\theta = 1$

$\theta = \left\{-\dfrac{5\pi}{3}, -\dfrac{\pi}{3}, 0, \dfrac{\pi}{3}, \dfrac{5\pi}{3}\right\}$