Solve for $x \in [0, 2\pi)$.

$(a-b)^2 = a^2 - 2ab + b^2$ $x = 4$

$x^2 = 16$

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

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

$\sin^2 x - \underbrace{2\sin x \cos x}_{\sin 2x} + \cos^2 x = 1$

$\underbrace{\sin^2 x + \cos^2 x}_{1} - \sin 2x = 1$

$1 - \sin 2x = 1$

$\sin(2x) = 0$

$2x = 0, \pi, 2\pi, 3\pi$

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

$\sin 0 - \cos 0 = 0 - 1 = -1$

$\sin\frac{\pi}{2} - \cos\frac{\pi}{2} = 1 - 0 = 1$

$\sin\pi - \cos\pi = 0 - (-1) = 1$

$\sin\frac{3\pi}{2} - \cos\frac{3\pi}{2} = -1 - 0 = -1$

* squaring both sides may introduce extraneous solutions, so go back & check answers in original equation!

$0 \le x < 2\pi$

$0 \le 2x < 4\pi$

$$\cos(4x) = \frac{1}{\sqrt{2}}$$

Solve for $x \in [0, 2\pi)$

$0 \le x < 2\pi$

$0 \le 4x < 8\pi$

$+2\pi \cdot \frac{4}{4} = \frac{8\pi}{4}$

$4x = \underbrace{\frac{\pi}{4}, \frac{7\pi}{4}}_{\text{solution 1st time around the unit circle}}, \underbrace{\frac{9\pi}{4}, \frac{15\pi}{4}}_{2}, \underbrace{\frac{17\pi}{4}, \frac{23\pi}{4}}_{3}, \underbrace{\frac{25\pi}{4}, \frac{31\pi}{4}}_{4}$

$$\boxed{x = \frac{\pi}{16}, \frac{7\pi}{16}, \frac{9\pi}{16}, \frac{15\pi}{16}, \frac{17\pi}{16}, \frac{23\pi}{16}, \frac{25\pi}{16}, \frac{31\pi}{16}}$$

$\tan(5x) = 0$

$0 \leq x < 2\pi$

$0 \leq 5x < 10\pi$

$5x = 0, \pi, 2\pi, 3\pi, 4\pi, 5\pi, 6\pi, 7\pi, 8\pi, 9\pi$

$$\boxed{x = 0, \frac{\pi}{5}, \frac{2\pi}{5}, \frac{3\pi}{5}, \frac{4\pi}{5}, \pi, \frac{6\pi}{5}, \frac{7\pi}{5}, \frac{8\pi}{5}, \frac{9\pi}{5}}$$

72. $\cos 2x = 2\cos x - 1$

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

$+1 \qquad +1$

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

$\cos^2 x = \cos x$

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

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

$\cos x = 0, \quad \cos x = 1$

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

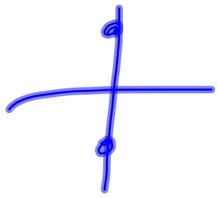
$\sin 2\theta = 2\sin\theta\cos\theta$

74. $\sin 4x - \cos 2x = 0$

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

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

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



☆ !

$\cos 2x = 0$

$2x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}$

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

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

$0 \le x < 2\pi$

$0 \le 2x < 4\pi$

$2x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$

$x = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}$

$\cos a \cos b - \sin a \sin b = \cos(a+b)$

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

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

$\cos 3x = 0$

$3x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}, \frac{9\pi}{2}, \frac{11\pi}{2}$

$\boxed{x = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}}$

82. $\cos(3x) + \cos(x) = 0$

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

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

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

$2\cos^3 x - \cancel{\cos x} - 2\sin^2 x\cos x + \cancel{\cos x} = 0$

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

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

$2\cos x \cos 2x = 0$

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

$\cos x = 0$ $\quad$ $2x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$ $\quad$ $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

84. $2\sin x\cos x - 2\sqrt{2}\sin x - \sqrt{3}\cos x + \sqrt{6} = 0$

$2\sin x(\cos x - \sqrt{2}) - \sqrt{3}(\cos x - \sqrt{2}) = 0$

$(\cos x - \sqrt{2})(2\sin x - \sqrt{3}) = 0$

$\cos x = \sqrt{2}$ $\quad$ $\sin x = \frac{\sqrt{3}}{2}$

$x = \varnothing$ $\quad$ $\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}}$

76. $\tan\frac{x}{2} = 1 - \cos x$

Homework:

6.6 Handout #71-83 odd;

Examples #3,4,7,8 from solving equaons handout