

Solve for $x \in [0, 2\pi)$. $(a-b)^2 = a^2 - 2ab + b^2$ $x=2$

$$(\sin x - \cos x)^2 = (1)^2 \quad x^2 = 4$$

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

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

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

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

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

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

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

*squaring both sides of an equation may introduce extraneous solutions, so make sure to plug answers back into original eq. to check.

$$0 \leq x < 2\pi$$

$$0 \leq 2x < 4\pi$$

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

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

$$0 \leq x < 2\pi$$

$$0 \leq 4x < 8\pi$$

$$4x = \frac{\pi}{4}, \frac{7\pi}{4}, \frac{9\pi}{4}, \frac{15\pi}{4}, \frac{17\pi}{4}, \frac{23\pi}{4}, \frac{25\pi}{4}, \frac{31\pi}{4}$$

1st time around unit circle

2 3 4

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

$$\tan(5x) = 0$$

$$0 \leq x < 2\pi$$

$$0 \leq 5x < 10\pi$$

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

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

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

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

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

$$\cos^2 x = \cos x$$

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

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

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

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

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

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

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

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

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

$$\cos 2x = 0$$

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

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

$$2\sin 2x = 1$$

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

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

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

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

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

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

$$\cos 3x = 0$$

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

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

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

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

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

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

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

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

$$\cos x (\cos^2 x - 3 \sin^2 x + 1) = 0$$

$$\cos x [\cos^2 x - 3(1 - \cos^2 x) + 1] = 0$$

$$\cos x [\cos^2 x - 3 + 3 \cos^2 x + 1] = 0$$

$$\cos x [4 \cos^2 x - 2] = 0$$

$$\cos x = 0$$

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

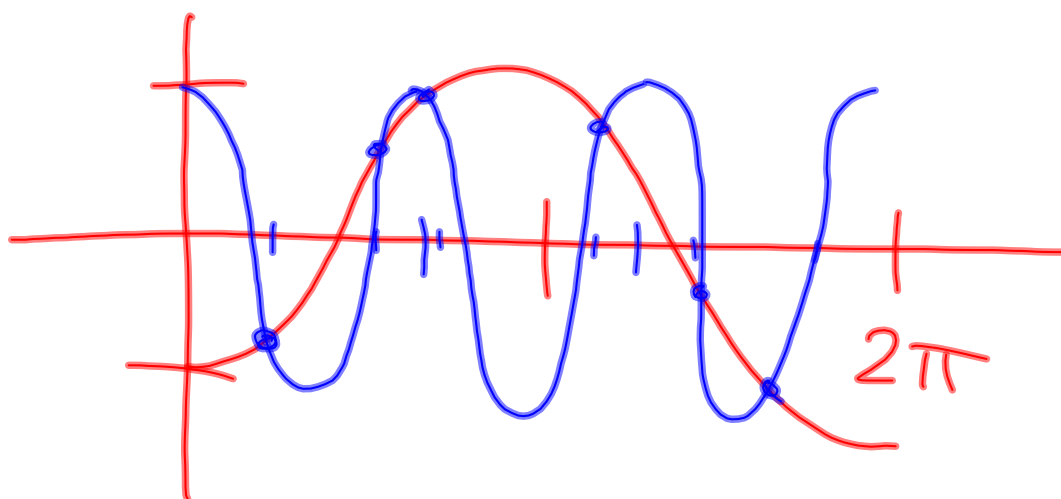
$$4 \cos^2 x - 2 = 0$$

$$\cos^2 x = \frac{1}{2}$$

$$\cos x = \pm \frac{1}{\sqrt{2}}$$

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

$$\cos 3x = -\cos x$$



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

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

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

$$\cos x = \sqrt{2}$$

$$x = \emptyset$$

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

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

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

Homework:

6.6 Handout #71-83 odd;

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