5.5B HW Answers

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40. $2\sin^2 x+\sin x-1=0$

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

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

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

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

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

The solutions in the interval $[0,2\pi)$ are $\frac{\pi}{6}, \frac{5\pi}{6}$, and $\frac{3\pi}{2}$.

42. $\cos^2 x+2\cos x-3=0$

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

$\cos x-1=0$ or $\cos x+3=0$

$\cos x=1$ $\cos x=-3$

$x=0$

$\cos x$ cannot be less than -1.

The solution in the interval $[0,2\pi)$ is 0.

44. $2\sin^2 x=4\sin x+6$

$2\sin^2 x-4\sin x-6=0$

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

$2\sin x+2=0$ or $\sin x-3=0$

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

$\sin x=-1$

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

$\sin x$ cannot be greater than 1.

The solution in the interval $[0,2\pi)$ is $\frac{3\pi}{2}$.

46. $\cos^2\theta-1=0$

$(\cos\theta-1)(\cos\theta+1)=1$

$\cos\theta-1=0$ or $\cos\theta+1=0$

$\cos\theta=1$ $\cos\theta=-1$

$\theta=0$ $\theta=\pi$

The solutions in the interval $[0,2\pi)$ are 0 and π.

48. $4\sin^2 x-3=0$

$\sin^2 x=\frac{3}{4}$

$\sin x=\pm\sqrt{\frac{3}{4}}$

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

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

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

The solutions in the interval $[0,2\pi)$ are $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}$, and $\frac{5\pi}{3}$.

50. $3\tan^2 x-9=0$

$\tan^2 x=\frac{9}{3}$

$\tan^2 x=3$

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

$\tan x=\sqrt{3}$ or $\tan x=-\sqrt{3}$

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

The solutions in the interval $[0,2\pi)$ are $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}$, and $\frac{5\pi}{3}$.

52. $4\sec^2 x-2=0$

56. $(2\cos x-\sqrt{3})(2\sin x-1)=0$

52. $4\sec^2 x - 2 = 0$

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

$\cos^2 x = 2$

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

No solution.

54. $(\tan x + 1)(\sin x - 1) = 0$

$\tan x + 1 = 0$ or $\sin x - 1 = 0$

$\tan x = -1$ $\sin x = 1$

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

The solutions in the interval $[0, 2\pi)$ are $\frac{3\pi}{4}$ and $\frac{7\pi}{4}$ since tan is undefined at $\frac{\pi}{2}$.

56. $\left(2\cos x - \sqrt{3}\right)(2\sin x - 1) = 0$

$2\cos x - \sqrt{3} = 0$ or $2\sin x - 1 = 0$

$2\cos x = \sqrt{3}$ $2\sin x = 1$

$\cos x = \frac{\sqrt{3}}{2}$ $\sin x = \frac{1}{2}$

$x = \frac{\pi}{6}$ $x = \frac{11\pi}{6}$ $x = \frac{\pi}{6}$ $x = \frac{5\pi}{6}$

The solutions in the interval $[0, 2\pi)$ are $\frac{\pi}{6}, \frac{5\pi}{6}$, and $\frac{11\pi}{6}$.

58. $\cot x(\tan x + 1) = 0$

$\cot x = 0$ or $\tan x + 1 = 0$

$\tan x = -1$

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

The solutions in the interval $[0, 2\pi)$ are $\frac{3\pi}{4}$ and $\frac{7\pi}{4}$ since tan is undefined at $\frac{\pi}{2}$ and $\frac{3\pi}{2}$

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

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

$\cos x = 0$ or $1 - 2\sin x = 0$

$-2\sin x = -1$

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

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

The solutions in the interval $[0, 2\pi)$ are $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$, and $\frac{3\pi}{2}$.

62. $\cot^2 x \sin x = \cot^2 x$

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

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

$\cot^2 x = 0$ or $\sin x - 1 = 0$

$\cot x = 0$ $\sin x = 1$

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

The solutions in the interval $[0, 2\pi)$ are $\frac{\pi}{2}$ and $\frac{3\pi}{2}$.