

Answers Chapter 7
Exercises pages 70-71

- 1) a) $\frac{\pi}{3}, \frac{2\pi}{3}$ b) 0 c) $\frac{2\pi}{3}, \frac{4\pi}{3}$ d) $\frac{3\pi}{2}$ e) $\frac{5\pi}{4}, \frac{7\pi}{4}$ f) $\frac{\pi}{2}, \frac{3\pi}{2}$
g) $\frac{5\pi}{6}, \frac{7\pi}{6}$ h) $\frac{5\pi}{4}, \frac{7\pi}{4}$ i) $0, \pi$ j) $\frac{\pi}{6}, \frac{5\pi}{6}$ k) $\frac{\pi}{2}$ l) $\frac{\pi}{3}, \frac{5\pi}{3}$
2) a) 1.744, 4.539 b) 0.588, 2.554 c) 3.959, 5.466 d) 1.225, 5.058 e) none
f) 0.302, 2.839 g) 0.927, 5.356 h) 2.889, 3.394 i) 2.133, 4.151 j) 3.610, 5.815
3) a) 3.494, 5.930 b) $\frac{\pi}{3}, \frac{5\pi}{3}$ c) 0.461, 5.822 d) $\frac{4\pi}{3}, \frac{5\pi}{3}$ e) 3.481, 5.943
f) 1.295, 4.989 g) $\frac{3\pi}{2}$ h) 1.375, 4.908 i) 0.490, 2.652 j) 0.490, 5.793

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- 4) 1.823, 4.460 5) no solutions 6) $\frac{\pi}{2}, \frac{3\pi}{2}$ 7) 1.766, 4.517 8) 3.785, 5.640
9) 3.425, 5.999 10) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ 11) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
12) $\frac{7\pi}{24}, \frac{11\pi}{24}, \frac{19\pi}{24}, \frac{23\pi}{24}, \frac{31\pi}{24}, \frac{35\pi}{24}, \frac{43\pi}{24}, \frac{47\pi}{24}$ 13) $0, \frac{2\pi}{3}, \frac{4\pi}{3}$ 14) $\frac{\pi}{6}, \frac{5\pi}{6}, 3.481, 5.943$
15) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$ 16) $\frac{7\pi}{18}, \frac{11\pi}{18}, \frac{19\pi}{18}, \frac{23\pi}{18}, \frac{31\pi}{18}, \frac{35\pi}{18}$
17) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ 18) $\frac{7\pi}{12}, \frac{11\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$
19) 0.678, 2.893, 3.820, 6.034
20) $0, \pi, \frac{7\pi}{6}, \frac{11\pi}{6}$ 21) $0, \frac{\pi}{3}, \frac{7\pi}{18}, \frac{11\pi}{18}, \frac{2\pi}{3}, \pi, \frac{19\pi}{18}, \frac{23\pi}{18}, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{31\pi}{18}, \frac{35\pi}{18}$

Practice Exercises

2) $\sec \theta \tan \theta \csc \theta$

$$\frac{1}{\cos \theta} \cdot \frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta}$$

$$\frac{1}{\cos^2 \theta}$$

$$\sec^2 \theta$$

4) $\frac{\sec \theta}{\tan \theta} = \sec \theta \cot \theta$

$$= \frac{1}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta}$$

$$= \frac{1}{\sin \theta}$$

$$= \csc \theta$$

5) $\frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta}$

$$\frac{\cos^2 \theta + \sin^2 \theta}{\sin \theta \cos \theta}$$

$$\frac{1}{\sin \theta \cos \theta}$$

$$\sec \theta \csc \theta$$

$$\sec \theta \csc \theta$$

6) $\frac{1}{\cos \theta} - \cos \theta$

$$\frac{1}{\cos \theta} - \frac{\cos^2 \theta}{\cos \theta}$$

$$\frac{\sin^2 \theta}{\cos \theta} = \frac{\sin \theta}{\cos \theta} \cdot \sin \theta = \tan \theta \sin \theta$$

1) $\cos x \tan x = \sin x$

$$\cos x \cdot \frac{\sin x}{\cos x}$$

$$\sin x$$

6) $\cos x (\sec x - \cos x) = \sin^2 x$

$$1 - \cos^2 x$$

$$\sin^2 x$$

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

$$\sin x \cos x \frac{\sin x}{\cos x}$$

$$\sin^2 x$$

$$1 - \cos^2 x$$

10) $\sec^2 x + \csc^2 x = \sec^2 x \csc^2 x$

$$\frac{1}{\cos^2 x} + \frac{1}{\sin^2 x}$$

$$\frac{\sin^2 x + \cos^2 x}{\cos^2 x \sin^2 x}$$

$$\frac{1}{\cos^2 x \sin^2 x} = \sec^2 x \csc^2 x$$

$$12) \frac{1}{\sin x \cos x} - \tan x = \cot x$$

$$\frac{1}{\sin x \cos x} - \frac{\sin x}{\cos x}$$

$$\frac{1 - \sin^2 x}{\sin x \cos x}$$

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

$$\frac{\cos x}{\sin x}$$

$$\cot x$$

$$13) \frac{1}{1 - \sin x} + \frac{1}{1 + \sin x} = 2 \sec^2 x$$

$$\frac{1 + \sin x + 1 - \sin x}{1 - \sin^2 x}$$

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

$$2 \sec^2 x$$

$$14) \sec x \csc x - \cot x = \tan x$$

$$\frac{1}{\cos x \sin x} - \frac{\cos x}{\sin x}$$

$$\frac{1 - \cos^2 x}{\cos x \sin x}$$

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

$$\frac{\sin x}{\cos x}$$

$$\tan x$$

$$16) \tan x + \cot x = \sec x \csc x$$

$$\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}$$

$$\frac{\sin^2 x + \cos^2 x}{\cos x \sin x}$$

$$\frac{1}{\cos x \sin x}$$

$$\sec x \csc x$$