

Solutions for Questions of Old Exams

1 Section 5.1

1. 90π rad/sec
2. 20π cm
3. $\frac{35\pi}{6}$ cm
4. $35^\circ 36' 23''$
5. $\frac{40\pi}{9}$ cm
6. $\frac{52800}{13}$ rad/min
 - (a) $\frac{16\pi}{45}$ cm
 - (b) $\frac{96\pi}{5}$ ft/sec
7. 120°
8. 5 cm
9. $29^\circ 9' 37''$
10. $\frac{1}{36}$ rev.
11. $\frac{7}{2}$ feet
12. $k = \frac{20}{\pi}$
13. 355°
14. $31^\circ 15'$
15. 1800π inch/min
16. 1.2
17. 4π cm
18. $\frac{25\pi}{144}$ rad
19. $\frac{4\pi}{3}$ cm
20. $\frac{\pi}{5}$ rad and 28°
21. $\left(\frac{300}{\pi}\right)^\circ$
22. $\frac{\pi}{2}$ cm
23. 337°

24. 420°
25. $\frac{\pi}{3}$ cm/sec
26. b
27. $\frac{10\pi}{3}$ rad/sec

2 Section 5.2

1. $11\sqrt{3}$ ft
 - (a) $\frac{3}{4}$
 - (b) $\frac{6\sqrt{3}+\sqrt{6}}{2}$
2. 4 ft
3. 30°
4. $x = 10(\sqrt{3} - 1)$
5. 20 ft
6. $3500(\sqrt{3} + 1)$

3 Section 5.3

1. a
 - (a) $\frac{-3\sqrt{3}}{2}$
 - (b) $\frac{4\sqrt{3}}{3}$
2. $\frac{-8}{15}$
3. $\frac{-19}{20}$
4. a
5. d
 - (a) $\frac{5\sqrt{3}}{2}$
 - (b) $\frac{3-\sqrt{3}}{2+\sqrt{3}}$
 - (c) $\frac{-\sqrt{3}}{3}$
 - (d) $\frac{3-5\sqrt{3}}{3}$
6. b

7. $-\frac{5}{12}$
8. negative, positive, negative
9. $\frac{15}{4}$
10. c
11. e
12. d
13. *II*
14. $6(\sqrt{3} - \sqrt{2})$
15. $-\frac{3\sqrt{5}}{5}$
16. a
17. $-\frac{\sqrt{30}}{5}$
18. c
19. $\frac{5}{4}$
20. $-\frac{\sqrt{1+m^2}}{m}$
21. $-\frac{\sqrt{5}}{2}$
22. $-\frac{3\sqrt{5}}{5}$
23. a

4 Section 5.4

1. $\frac{3}{5}$
2. *III* quadrant , negative
3. $\sqrt{3}$
4. $-\frac{5}{2}$
5. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
6. $-11\sqrt{3}$
7. $-\frac{\sqrt{\cot^2 \theta + 1}}{\cot \theta}$
8. $\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

9. b
10. even
11. $1 - \cot^2 t$
12. $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$
13. odd
14. *I* quadrant
15. $-\frac{\sqrt{2}}{2}$
16. $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
17. a
 - (a) $2 \csc t$
 - (b) $\tan t$
 - (c) 0
 - (d) $2 \cot x$
18. $\frac{1}{2}$
19. $-\frac{37}{15}$
20. $-\frac{3\sqrt{3}}{2}$
21. -2
22. $\frac{1}{2}$
23. $\frac{3\sqrt{2}}{4}$
24. $\left(\frac{2}{3}, \frac{\sqrt{5}}{3}\right)$
25. $\frac{9\pi}{10}$
26. $\left(-\frac{\sqrt{3}}{6}, -\frac{\sqrt{33}}{6}\right)$
27. $\left(-\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$
28. (0, 1)
29. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
30. $\left(-\frac{7}{25}, \frac{24}{25}\right)$

31. -1

32. $\frac{1}{5}$

33. $\frac{\sqrt{1+\tan^2\theta}}{1+\tan^2\theta}$

34. $-\frac{9}{16}$

35. $3 \cos \theta$

36. $\frac{4}{3}$

(a) $\sin x + \cos x$

(b) 2

(c) $2 \sec x \tan x - 1$

(d) $2 \sec x \csc x$

(e) $\sin^6 x$

(f) $-\sin^4 x$

(g) $\tan \theta$

(h) $\csc^4 x$

(i) $\cot \theta \csc \theta$

(j) 1

(k) -1

(l) $1 + 2 \cot^2 \theta$

(m) $2 \sec x$

37. a

5 Section 5.5

1. 1
2. 3 x-intercepts, 2 maximum values, 2 minimum values.
3. $-2\sqrt{2}$
4. (a) amplitude = 3, Period = 3π
(b) Maximum = 0, Minimum = -3 .
5. (a)
(b) Period = $\frac{\pi}{3}$, Amplitude = $\frac{1}{3}$
(c) Range = $[0, \frac{1}{3}]$
6. $(-2\pi, -\pi) \cup (\pi, 2\pi)$
7. b
8. (a) Amplitude = 2
(b) Phase Shift = $\frac{\pi}{4}$ to the right
(c) $f(x) = -2 \cos(2x - \frac{\pi}{2})$
9. $\frac{\pi}{2}$
10. Amplitude = 4, Phase Shift = $\frac{\pi}{2}$ to the left, Period = 4π
11. d
12. Period = $\frac{\pi}{2}$, Amplitude = $\frac{1}{2}$.
13. (a) Period = π
(b) Phase shift = $\frac{\pi}{8}$ to the right
(c) Range = $[-2, 2]$
- 14.
15. Amplitude = $\frac{3}{4}$, Phase shift = $\frac{\pi}{4}$ to the right, Period = π .
16. $\frac{1}{2}$
17. Amplitude = 6, Phase shift = $\frac{\pi}{4}$ to the right, Period = $\frac{\pi}{2}$.
18. $a = -3, b = 2$.
19. Amplitude = 1, Phase shift = $\frac{\pi}{4}$ to the right, Period = π .
20. d
21. 1

- 22. b
- 23. $(\frac{\pi}{2}, \pi)$
- 24. 2
- 25. b

6 Section 5.6

- 1. Four
- 2. (a) $\frac{\pi}{2}$
 (b) $\frac{\pi}{6}$ to the left
 (c) $(-\infty, \infty)$
 (d)
- 3. Period = $\frac{3\pi}{2}$, x-intercepts: $(\frac{3\pi}{4}, 0)$ and $(\frac{9\pi}{4}, 0)$ on $[0, 3\pi]$, Asymptotes: $x = \frac{3\pi}{2}$ and $x = 3\pi$ on $[0, 3\pi]$.
- 4. Period = $\frac{\pi}{3}$, Phase shift = $\frac{2\pi}{3}$ to the right, Vertical translation 4 units up.
- 5. (a) Period $\frac{\pi}{2}$, Phase shift = $\frac{\pi}{8}$ to the left.
 (b) Three points: $(0, \frac{3}{2})$, $(\frac{\pi}{8}, 0)$, and $(\frac{\pi}{4}, -\frac{3}{2})$, Asymptotes: $x = -\frac{\pi}{8}$ and $x = \frac{3\pi}{8}$.
- 6. Range = $(-\infty, \frac{1}{2}] \cup [\frac{7}{2}, \infty)$, Period = 6π .
- 7. 2
- 8. $a = -\pi$ and $b = 2\pi$.
- 9. Range = $(-\infty, \frac{-1}{2}] \cup [\frac{5}{2}, \infty)$, Period = $\frac{2\pi}{3}$.
- 10. c
- 11. d
- 12. (a) $(\pm\pi, 0)$
 (b) NO
 (c) $x = 0$
 (d) $(-\infty, \infty)$
 (e)
- 13.
- 14. Range = $(-\infty, -4] \cup [2, \infty)$
- 15. $x = (2n + 1)\frac{\pi}{2}$ where n is an integer.

16. c
17. Period = 6π , Range = $(-\infty, 0] \cup [2, \infty)$
18. Range = $(-\infty, -3] \cup [1, \infty)$
19. π
20. $R - \left\{ \frac{\pi}{2} \pm n\pi \text{ where } n \text{ is an integer} \right\}$
21. a
22. $A = 3$, $B = 4$, and $C = 8$.
23. e
24. Range = $(-\infty, \frac{-11}{4}] \cup [\frac{1}{4}, \infty)$
25. 4
26. $(\frac{\pi}{4}, 0)$, $(\frac{3\pi}{4}, 0)$, $(\frac{5\pi}{4}, 0)$, $(\frac{7\pi}{4}, 0)$
27. b
28. $x = \frac{n}{2}\pi - \frac{\pi}{6}$ where n is an integer.

7 Section 5.7

1. a
2. $(0, 0)$ and $(\frac{\pi}{2} + n\pi, 0)$
3. 3