

Answers for Even-Numbered Problems
Unit 5

5.1

4a. $A \approx 3 + \sqrt{2} + \sqrt{3}$; overestimate

4b. $A \approx 1 + \sqrt{2} + \sqrt{3}$; underestimate

13. Solutions manual only provides solutions for L_6 and R_6 . The solution for M_3 is $d \approx 40.5$ ft.

7.7

31. Solutions manual only provides solutions for M_4 . The solution for T_4 is $\int_1^5 f(x) dx \approx 14.15$.

5.2

8a. $\int_3^9 f(x) dx \approx 4.2$; f inc \rightarrow overestimate

8b. $\int_3^9 f(x) dx \approx -6.2$; f inc \rightarrow underestimate

8c. $\int_3^9 f(x) dx \approx -0.8$; cannot determine

18. $\int_{\pi}^{2\pi} \frac{\cos x}{x} dx$

22. -3 (Be sure to use the limiting value of a Riemann sum, as demonstrated in class.)

34a. $\int_0^2 g(x) dx = 4$

34b. $\int_2^6 g(x) dx = -2\pi$

34c. $\int_0^7 g(x) dx = \frac{9}{2} - 2\pi$

36. $-\frac{9}{2}$

40. 25

48. 8.4

50. 17

5.3

2a. $g(0) = 0$; $g(1) = 1/2$; $g(2) = 0$; $g(3) = -1/2$; $g(4) = 0$; $g(5) = 3/2$; $g(6) = 4$

2b. $g(7) \approx 6.2$

2c. Use absolute extreme on an interval test: Minimum at $x = 3$; Maximum at $x = 7$

2d. Sketch not provided – check solution manual

4a. $g(0) = g(6) = 0$

4b. $g(1) \approx 2.8$; $g(2) \approx 4.9$; $g(3) \approx 5.7$; $g(4) \approx 4.9$; $g(5) \approx 2.8$

4c. $(0, 3)$

4d. Maximum at $x = 3$

4e-f. Sketches not provided – check solution manual

8. $g'(x) = e^{x^2-x}$

12. $G'(x) = -\cos \sqrt{x}$

16. $y' = 4x^3 \cos^2(x^4)$

18. $y' = -\sqrt{1 + \sin^2 x} \cos x$

60. $(-1, 1)$

62. $g''\left(\frac{\pi}{6}\right) = \frac{\sqrt{15}}{4}$

$$76a. g(x) = \begin{cases} 0 & \text{if } x < 0 \\ \frac{x^2}{2} & \text{if } 0 \leq x \leq 1 \\ -\frac{x^2}{2} + 2x - 1 & \text{if } 1 < x \leq 2 \\ 1 & \text{if } x > 2 \end{cases}$$

76b. Sketches not provided – check solution manual

76c. f is differentiable on $(-\infty, 0) \cup (0, 1) \cup (1, 2) \cup (2, \infty)$; g is differentiable on $(-\infty, \infty)$

5.4

6. $\frac{2x^{5/2}}{5} + \frac{3x^{5/3}}{5} + C$

12. $\frac{x^3}{3} + x + \tan^{-1} x + C$

14. $-\cot t - 2e^t + C$

16. $\tan t + \sec t + C$

18. $2\sin x + C$

34. $\frac{5}{2} - \frac{4}{\ln 5}$

44. $\frac{5}{2}$

46. 3

54. Total bee population after the first 15 weeks

60a. $-\frac{10}{3}$ m

60b. $\frac{98}{3}$ m

62a. $v(t) = t^2 + 3t - 4$

62b. $\frac{89}{6}$ m

64. 1800 L

5.5

8. $\frac{1}{3}e^{x^3} + C$

12. $\frac{1}{2}\tan(2\theta) + C$

16. $\sin(e^x) + C$

18. $-2\cos\sqrt{x} + C$

20. $\frac{1}{3}\ln|z^3 + 1| + C$

22. $-\frac{1}{5}\cos^5\theta + C$

24. $-\frac{2}{3}\cos(1 + x^{3/2}) + C$

28. $-e^{\cos t} + C$

32. $-\cos(\ln x) + C$

34. $-\frac{1}{\pi}\sin\left(\frac{\pi}{x}\right) + C$

$$38. 2\sqrt{1+\tan t} + C$$

$$48. \frac{1}{5}(x^2+1)^{5/2} - \frac{1}{3}(x^2+1)^{3/2} + C$$

$$60. \frac{1-e^{-1}}{2}$$

$$64. \frac{a^3}{3}$$

$$70. \frac{\pi^2}{72}$$

$$44. \frac{1}{2}\tan^{-1}(x^2) + C$$

$$56. \frac{\ln 16}{5}$$

$$62. 1 - \cos(1)$$

$$68. \frac{10}{3}$$