MA 222 Even Answers

Chapter 6

Section 6.2 (p. 218)

38. $y' = 2x\cos^2 x\cos x^2 - 2\sin x^2 \sin x\cos x$

Section 6.3 (p. 222)

58. $v(0.96) = 7.4$ ft/s

Section 6.6 (p. 232)

4. $\log_{27} 3 = \frac{1}{3}$

14. 16

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

28. $\log_5 \frac{7}{6}$

30. $\log_a x^5 y$

38. $2 + 2\log_2 x$

46. $\log_{10} x + \frac{1}{2}\log_{10}(x^2 + 1)$

Section 6.7 (p. 237)

2. $y' = \frac{1}{x}$

8. $y' = \frac{12}{x}$

16. $y' = -\frac{1}{2x}$

22. $y' = -\frac{1}{x(2x-1)}$

28. $y' = \frac{1}{2x} - \tan x$

32. $y' = \frac{1}{2x\sqrt{\ln x}}$

Section 6.8 (p. 240)

6. $\frac{dy}{dt} = 4te^{2t^2}$

18. $y' = \frac{e^x(x-2)}{x^3}$

20. $\frac{dM}{d\theta} = e^{\theta^2}(2\theta\cos\theta - \sin\theta)$

30. $y' = \frac{e^x+1-xe^x\ln x}{x(e^x+1)^2}$

Section 6.10 (p. 247)

10. $v(\pi/4) = -8$ m/s

16. $-0.73°$C/min

Chapter 7

Section 7.1 (p. 254)

4. $2\sqrt{x+2} + C$

6. $-\frac{1}{4}\cos^4 x + C$

12. $\frac{1}{3}(1+e^{2\theta})^{3/2} + C$

32. $\frac{1}{4}(1+\sin z)^4 + C$

Section 7.2 (p. 257)

4. $-\frac{1}{4}\ln|1-2x^2| + C$

10. $\frac{1}{6}e^{6x} + C$

20. $\frac{1}{2}e^{\tan 2x} + C$

38. $\frac{1}{2}\left(1-\frac{1}{e}\right)$

48. $\ln 2$

50. 1

Section 7.3 (p. 260)

2. $-\frac{1}{3}\cos 3x + C$

10. $\frac{1}{5}\tan 5t + C$

22. $\ln|\sec e^x| + C$

28. $-\frac{1}{2}\csc^2 x + C$

34. $\frac{1}{4}$

42. $5\sin 8 \approx 4.9$

Section 7.7 (p. 278)

2. $x\sin x + \cos x + C$

6. $x\ln x - x + C$

10. $-\frac{\ln x+1}{x} + C$

12. $-x^2\cos x + 2x\sin x + 2\cos x + C$

20. $-\frac{1}{2}e^{-x}(\cos x + \sin x) + C$

22. $\frac{1}{2}\sec x\tan x + \ln|\sec x + \tan x| + C$

26. $\pi(\pi - 2)$

Section 7.8 (p. 287)

2. $x - 7\ln|x+2|$

10. $-\frac{1}{x-2} - 2\ln|x-2| + C$

12. $-\frac{4}{x+2} + C$

18. $\frac{2}{x-3} + \frac{3}{x^2+9}$

20. $\frac{2}{x-1} - \frac{1}{x+2} + \frac{1}{x^2+1}$

22. $\frac{x}{x^2+1} + \frac{2x}{(x^2+1)^2}$

Review Exercises (p. 291)

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

10. $\ln(4 + e^x) + C$

22. $-\frac{1}{3}(4 - x^2)^{3/2} + C$

26. $\frac{1}{4}e^{2x^2} + C$

Chapter 10

Section 10.1 (p. 365)

2. 3

4. 5

10. $\frac{10}{11}$

12. $\frac{5}{8}$

20. $\frac{5}{333}$

Section 10.3 (p. 376)
No solutions given.
Section 10.4 (p. 380)

4. $e^{-x^2} = 1 - x^2 + \frac{x^4}{2!} - \frac{x^6}{3!} + \frac{x^8}{4!} - \dots$

12. $x \ln(1 + x) = x^2 - \frac{x^3}{2} + \frac{x^4}{3} - \frac{x^5}{4} + \dots$

14. $x^2 \sin 2x = 2x^3 - \frac{2^3x^5}{3!} + \frac{2^5x^7}{5!} - \dots$

18. $\frac{\sin x - x}{x^2} = -\frac{x}{3!} + \frac{x^3}{5!} - \frac{x^5}{7!} + \dots$

Section 10.5 (p. 386)

4. To three terms, $\cos\frac{\pi}{9} = 0.9396951$. The max error is -0.0000025, so the values agree to 4 decimal places.

12. To 10 terms, $e = 2.71828$.

14. To three terms, the integral has value -0.8128307. The error term is 0.0000003, so the integral to 5 decimal places is -0.08128.

Section 10.6 (p. 397)

2. a. $a_0 = 1$, $a_1 = 0$, $a_2 = 0$

   b. $b_1 = \frac{2}{\pi}$, $b_2 = 0$, $b_3 = \frac{2}{3\pi}$

   So $f(t) = \frac{1}{2} + \frac{2}{\pi}\left(\sin t + \frac{1}{3}\sin 3t + \frac{1}{5}\sin 5t + \ldots\right)$.

4. a. $a_0 = 0$, $a_1 = 0$, $a_2 = 0$

   b. $b_1 = \frac{12}{\pi}$, $b_2 = 0$, $b_3 = \frac{12}{3\pi}$

   So $f(t) = \frac{12}{\pi}\left(\sin\frac{\pi t}{2} + \frac{1}{3}\sin\frac{3\pi t}{2} + \frac{1}{5}\sin\frac{5\pi t}{2} + \ldots\right)$.

6. $f(t) = 1 - \frac{8}{\pi^2}\left(\cos\frac{\pi t}{2} + \frac{1}{3^2}\cos\frac{3\pi t}{2} + \frac{1}{5^2}\cos\frac{5\pi t}{2} + \ldots\right)$

8. $f(t) = \frac{\pi}{2} + \frac{4}{\pi}\left(\cos t + \frac{1}{3^2}\cos 3t + \frac{1}{5^2}\cos 5t + \ldots\right)$

Chapter 11

Section 11.1 (p. 402)

18. $y = \frac{1}{2}x^4 - 2$

20. $y = \sin x + 1$

Section 11.2 (p. 407)

8. $\sin x + \ln|y| = c$

36. $\frac{1}{y} + \ln|1 + x| + 1 = 0$

Section 11.3 (p. 412)

2. $y = -2 + ce^x$

12. $y = \frac{(e^x + c)}{x^2}$

36. $y = \sin x$

Section 11.4 (p. 386)

6. 140 days

8. 6.3 hours

12. 7.0° C

14. 7.7 minutes

16. 18.3° C

22. The orthogonal trajectories are $x^2 + 2y^2 = k$.

24. The orthogonal trajectories are $xy = k$.

26. The orthogonal trajectories are $3y^2 + x^2 = k$.

Chapter 12

Section 12.1 (p. 431)

2. $y = c_1 e^{4x} + c_2 e^{-5x}$

4. $y = c_1 e^{2x} + c_2 e^{-2x}$

12. $y = e^{2x} - e^{x}$

14. $y = \frac{4}{3}e^{x} - \frac{1}{3}e^{-5x}$

30. $y = \frac{2}{5}e^{x} + \frac{3}{5}e^{-(2/3)x}$

Section 12.2 (p. 434)

4. $y = c_1 e^{-(1/2)x} + c_2 x e^{-(1/2)x}$

10. $y = e^{(1/2)x}\left(c_1 \cos \frac{\sqrt{3}}{2}x + c_2 \sin \frac{\sqrt{3}}{2}x\right)$

46. $y = -2xe^{-2(x+1)}$

Section 12.3 (p. 440)

8. $y = c_1 \cos 2x + c_2 \sin 2x + \frac{1}{2}x^2 - \frac{1}{4}x - \frac{1}{4}$

10. $y = e^{-x/2}\left(c_1 \cos \frac{\sqrt{7}}{2}x + c_2 \sin \frac{\sqrt{7}}{2}x\right) + \frac{3}{2}e^{2x}$

14. $y = c_1 e^{2x} + c_2 e^{-2x} + \cos x$

16. $y = c_1 e^{4x} + c_2 e^{-x} - \frac{5}{34}\cos x - \frac{3}{34}\sin x$

20. $y = c_1 e^{x} + c_2 e^{-x} + \frac{1}{3}e^{2x} - 4$

24. $y = c_1 \cos \sqrt{3}x + c_2 \sin \sqrt{3}x + 2xe^{x} - e^{x} + 1$

30. $y = e^{x}\left(-\frac{5}{2}\cos 2x + \frac{3}{4}\sin 2x\right) + \frac{1}{2}\cos x + \sin x$

40. $y_p = -\frac{1}{5}e^{x} + \frac{1}{7}\sin x$

Section 12.4 (p. 449)

2. $x(t) = -\frac{7}{12}\cos 8t$

4. $x(t) = -\frac{7}{12}\cos 8t - \frac{1}{24}\sin 8t + \frac{1}{12}\sin 4t$

10. $x(t) = e^{-t/2}\left(-\frac{1}{3}\cos \frac{1}{2}\sqrt{255}t - \frac{1}{3\sqrt{255}}\sin \frac{1}{2}\sqrt{255}t\right)$

14. $x(t) = \frac{1}{4}e^{-8t} + 2te^{-8t}$

16. $x(t) = \frac{1}{4}e^{-8t} + \frac{7}{4}te^{-8t} + \frac{1}{32}\sin 8t$

Chapter 13

Section 13.1-3 (p. 459)

2. $\frac{5}{s-2}$

10. $\frac{4}{(s-3)^3}$

12. $\frac{5}{s^2} + \frac{3}{s-2}$

14. $3e^{5t}$

16. $\cos\sqrt{7}t$

20. $t\cos 2t$

24. $\frac{5}{3}\sin 3t$

38. $-2 + e^t + e^{-t}$

42. $-\frac{1}{4} - \frac{1}{2}t + \frac{1}{4}e^{2t}$

48. $-e^{-t} + te^{-t} + e^{-2t}$

Section 13.4 (p. 464)

8. $y = e^t - e^{-3t}$

12. $y = \frac{5}{8}\sin 2t - \frac{1}{4}t\cos 2t$

14. $y = \frac{3}{2}\sin t - \frac{1}{2}t\cos t$

16. $y = -\frac{1}{3}\cos 3t + \frac{2}{3}\sin 3t + \frac{1}{3}e^{-6t}$

18. $y = e^{2t} - 2te^{-3t}$

24. $y = \frac{4}{5}e^{3t} - e^{2t} + \frac{1}{5}e^{-2t}$

28. $y = 2e^t - e^{2t}\cos t$