MA23200 Even HW answers

HW4 Section 5.6

2. $xe^{2x} - \dfrac{e^{2x}}{2} + C$

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

10. $\dfrac{x^4 \ln x}{4} - \dfrac{x^4}{16} + C$

16. $\left(\dfrac{x^2}{2} + x\right) \ln x - \dfrac{x^2}{4} - x + C$

HW5 Section 5.6

34. $6 \ln 6 - 5$

38. $\dfrac{10\pi}{3} - \dfrac{5\sqrt{3}}{2}$

40. $N(0) + \displaystyle\int_0^{60} N'(t)dt = 251869$

42. (a) $\dfrac{1 - e^{-kT}(kT + 1)}{k^2}$

    (b) $25 - 75e^{-2} \approx 14.85$

56. HINT: $\displaystyle\int x^n \cos x \, dx = \int x^n d \sin x = x^n \sin x - \int \sin x \, dx^n$

HW6 Section 5.7

52. $T_{12} = 15.0958$

HW7 Section 5.8

2. 2π

10. $\pi \ln 4$

HW8 Section 5.8

26. $\dfrac{3}{4}$

32. 100

HW9 Section 5.9

8. Divergent

28. $\dfrac{2}{e}$

34. $\dfrac{A}{k}$

36. DNE

HW10 Section 7.1

4. $f(3,7) = 1, f(1,99) = 2, f(2,-1) = 0$

14. $Q(21,20) = 105, Q(19,20) = 95$

HW11 Section 7.2

2. $\dfrac{\partial z}{\partial x} = 3(x-y)^2, \dfrac{\partial z}{\partial y} = -3(x-y)^2, \left.\dfrac{\partial z}{\partial x}\right|_{(-2,-3)} = 3, \left.\dfrac{\partial z}{\partial y}\right|_{(0,-5)} = -75$

6. $f_x = 5, f_y = 7$

12. $f_x = 2ye^{2xy}, f_y = 2xe^{2xy}$

16. $f_x = 5x^4 - 8xy^2 + 5y^3, f_y = -8x^2y + 15xy^2 - 2$

HW12 Section 7.2

40. $f_{xx} = 4e^{2x-y}, f_{yy} = e^{2x-y}, f_{xy} = -2e^{2x-y}, f_{yx} = -2e^{2x-y}$

46. $f_{xx} = 20x^3 - 8y, f_{yy} = -8x^2 + 30xy, f_{xy} = -16xy + 15y^2, f_{yx} = -16xy + 15y^2$

52. 8.2

HW13 Section 7.3

2. Relative minimum at $(-\frac{5}{3}, \frac{10}{3})$

6. Relative minimum at $(2, 2)$, saddle point at $(0, 0)$

12. Saddle point at $(0, 0)$

HW14 Section 7.3

20. Minimum is $-\frac{7}{2}$, occurs at $(\frac{1}{2}, -1)$, no global maximum

22. Relative minimum 6 at $(1, 2)$

HW15 Section 7.4

No even numbered problems assigned.

HW16 Section 7.5

2. 1

8. $\dfrac{(e^2-1)^2}{2}$

HW17 Section 7.5

22. $\dfrac{7432}{15}$

HW18 Section 8.1

4. $-5\cos x - 4x + C$

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

24. $\sin x - x\cos x + 3$

HW19 Section 8.1

32. $\dfrac{e^{2x} + 6x + 15}{4}$

40. Verification problem

46. Verification problem

HW20 Section 8.1

36. (a)$\dfrac{1}{2}$

38. (a)-2

HW21 Section 8.2

4. $-1 < x < 2$

8. $Ce^{-4x} + \dfrac{1}{2}$

16. $\dfrac{C}{x} + \dfrac{\sin x}{x} - \cos x$

HW22 Section 8.2

32. $3e^{\frac{1}{t}-1} + 1$

42. (a)$Y' + kY = 60k$, (b) $-45e^{kx} + 60$,
(c)$\dfrac{1}{10}\ln\dfrac{13}{15}$, (d)18.10727987, (e) 64.0311202

48. $1 - e^{1.2x}$

HW23 Section 8.3

2. (a)$-\dfrac{4}{5}$, (b)unstable, (c)N/A

HW24 Section 8.4

2. $\sqrt[3]{\frac{5}{2}x^2 + C}$

10. $y^2 = \frac{3}{2e^{t^3} + C}$

12. $3y^2 + y^6 - 3x^2 = C$

HW25 Section 8.4

22. $y = \sqrt{13e^{2t} - 4}$

28. $y = -\ln(\frac{3}{2}e^2 - \frac{1}{2}e^{2t})$

38. (b) $+\infty$

HW26 Section 8.5

2. (a)0.4294967296, (c)$y = 4e^{-x}$

HW27 Section 6.1

6. $\begin{bmatrix} 12 & -3 \\ 21 & -27 \end{bmatrix}$

14. $\begin{bmatrix} 27 \\ -62 \end{bmatrix}$

24. Both are $\begin{bmatrix} 8 & 28 & 14 \\ 3 & 27 & -25 \\ -26 & 14 & -20 \end{bmatrix}$

HW28 Section 6.1

32. (a)$\begin{bmatrix} 0.5 & 1.25 \\ 0.75 & 0.25 \end{bmatrix}$, (b)$\begin{bmatrix} 110 \\ 87 \end{bmatrix}$, (c)$\approx \begin{bmatrix} 164 \\ 104 \end{bmatrix}$

HW29 Section 6.2

2. $x = 10, y = 5$

6. $a = k, b = 4k - 2$ where k is any real number.

18. $x = 46, y = 18, z = 32$

34. $x = -\frac{8}{5}z + \frac{11}{5}, y = \frac{7}{5}z + \frac{1}{5}$

HW30 Section 6.2

26. $x = 16, y = 20, z = -6$

28. $x = 1, y = 5, z = 5$

42. $H \approx 113, A \approx 42$

HW31 Section 6.3

6. $\begin{bmatrix} 7/18 & -1/18 \\ 2/9 & 1/9 \end{bmatrix}$

10. $\begin{bmatrix} -2 & 2 & 1 \\ 1 & 2 & 0 \\ 0 & -1 & 0 \end{bmatrix}$

14. $\begin{bmatrix} -61 & -75 & -81 \\ 21 & 26 & 28 \\ 31 & 38 & 41 \end{bmatrix}$

HW32 Section 6.3

26. 4, invertible.

30. 0, not invertible.

34. -77, invertible.

HW33 Section 6.4

2. Eigenvector of eigenvalue 3.

6. Eigenvector of eigenvalue 10.

12. Not an eigenvector.

16. $v = 5w - 2u$

HW34 Section 6.4

22. Eigenvalues $r_1 = 4, r_2 = -1$, eigenvectors $v_1 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}, v_2 = \begin{bmatrix} -4 \\ 3 \end{bmatrix}$

40. $\begin{bmatrix} -81 \\ 81 \end{bmatrix}$

HW35 Section 6.5

8. $c_1 3^n + c_2 5^n$

16. $\frac{11}{4}(-1)^n + \frac{17}{4}3^n$

38. (a) $x_n = \frac{5000}{\sqrt{11761}}\left(\frac{81+\sqrt{11761}}{200}\right)^n - \frac{5000}{\sqrt{11761}}\left(\frac{81-\sqrt{11761}}{200}\right)^n$.
    (b) $\lim_{n\to\infty} x_n = 0$