

Lab 7 Solutions

$$1. \quad 2e^t + 2te^t + \frac{1}{2}t^{-3/2}$$

$$2. \quad \frac{-3(5+3z) - 3(5-3z)}{(5+3z)^2}$$

$$3. \quad \frac{3x^2}{9}(3\ln x - 1) + \frac{x^2}{9}\left(\frac{3}{x}\right)$$

$$4. \quad -(1+e^{-\theta})^2(-e^{-\theta})$$

$$5. \quad 1 \cdot (\theta^{-1/2} - \theta^{-2}) + \theta \left(-\frac{1}{2}\theta^{-3/2} + 2\theta^{-3}\right)$$

$$6. \quad \frac{1}{\cos \theta} (-\sin \theta)$$

$$7. \quad \frac{1}{\ln(2y^3)} \cdot \left(\frac{1}{2y^3}\right) \cdot (6y^2)$$

$$8. \quad kx^{k-1} + k^x \ln k$$

$$9. \quad 0$$

$$10. \quad 3\sin^2(\theta)(\cos \theta)$$

$$11. \quad 2(\cos(3t+5))(-\sin(3t+5))(3)$$

$$12. \quad 2\tan(2+3\alpha)(\sec^2(2+3\alpha))(3)$$

$$13. \quad 2\sin(3\theta-\pi)(\cos(3\theta-\pi))(3)$$

$$14. \quad \frac{1}{e^{-t}-t}(-e^{-t}-1)$$

$$15. \quad \frac{\cos(5-\theta)(-1)(\theta^2) - 2\theta(\sin(5-\theta))}{(\theta^2)^2}$$

$$16. \quad \frac{1 \cdot \sin^2(\theta) - 2\sin(\theta)(\cos(\theta))(\theta)}{(\sin^2 \theta)^2}$$

$$17. \quad \frac{(2x + \frac{1}{2}x^{-1/2})x^{3/2} - \frac{3}{2}x^{1/2}(x^2 + \sqrt{x} + 1)}{(x^{3/2})^2}$$

$$18. \quad -(2^w + e^w)^{-2}(2^w \ln 2 + e^w)$$

$$19. \quad \frac{1}{(2-x)^2}(-1)$$

$$20. \quad e^{(e^{\theta} + e^{-\theta})} (e^{\theta} - e^{-\theta})$$

$$21. \quad \cos(e^n)(e^n)$$

$$22. \quad e^{\tan(\sin \alpha)} \cdot \sec^2(\sin \alpha) \cdot \cos(\alpha)$$

$$23. \quad 1 \cdot \cos(\sqrt{t}e^t) + t(-\sin(\sqrt{t}e^t))\left[\frac{1}{2}t^{-1/2}e^t + \sqrt{t}e^t\right]$$

$$24. \quad e(\tan 2 + \tan r)^{e-1} (\sec(r))$$

$$25. \quad 1 \cdot e^{\tan x} + x e^{\tan x} \cdot \sec^2(x)$$

$$26. \quad 2 \cdot e^{2x} \cdot \sin^2(3x) + e^{2x}(2\sin(3x))(\cos(3x))(3)$$

$$27. \quad \frac{1}{1+(3x^2+1)^2}(6x)$$

$$28. \quad 2^{\sin x} \ln(2)(\cos x)(\cos x + 2^{\sin x}(-\sin x))$$

$$29. \quad \frac{1}{e^{ax}} \cdot e^{ax} \cdot a$$

$$30. \quad \frac{1}{e^{ax}} \cdot e^{ax} \cdot a + 0$$

$$31. e^{k\theta} \cdot k$$

$$32. -4ke^{-4kt} \cdot \sin t + e^{-4kt} \cos t$$

$$33. 2ate^{-ct} + (at^2 + b)(e^{-ct} \cdot (-c))$$

$$34. \frac{1}{2} (a^2 - \sin^2 \theta)^{-\frac{1}{2}} (-2 \sin \theta \cos \theta)$$

$$35. a^{5x} (\ln a) 5$$

$$36. \frac{-2x(a^2 + x^2) - 2x(a^2 - x^2)}{(a^2 + x^2)^2}$$

$$37. \frac{2ar(b + r^3) - 3r^2(ar^2)}{(b + r^3)^2}$$

$$38. \frac{-2s(\sqrt{a^2 + s^2}) - \frac{1}{2}(a^2 + s^2)^{-\frac{1}{2}}(2s)(\sqrt{a^2 - s^2})}{(\sqrt{a^2 + s^2})^2}$$

$$39. \frac{1}{(\frac{d}{x})^2 + 1} \left( -\frac{2}{x^2} \right)$$

$$40. \frac{1}{\sin(\frac{t}{k})} \cdot \cos(\frac{t}{k}) \cdot \frac{1}{k}$$

$$41. -2(a^2 - w^2)^{-3} (-2w)$$

$$42. \frac{(e^x + e^{-x})(e^x + e^{-x}) - (e^x - e^{-x})(e^x - e^{-x})}{(e^x + e^{-x})^2}$$

$$43. \frac{e^{ay} \cdot a \cdot 2ab}{a^2 + b^2}$$

$$44. \frac{(ae^{ax} + ae^{-ax})(e^{ax} + e^{-ax}) - (ae^{ax} - ae^{-ax})(e^{ax} - e^{-ax})}{(e^{ax} + e^{-ax})^2}$$

$$45. \frac{\left( \frac{1}{kt} \cdot k + 1 \right) (\ln(kt) - t) - \left( \frac{1}{kt} \cdot k - 1 \right) (\ln kt + t)}{(\ln(kt) - t)^2}$$

$$46. \frac{(e^{t^2} \cdot 2t + 1)(\sin(2t)) - 2\cos(2t)(e^{t^2})}{(\sin(2t))^2}$$

$$47. \cos(\sqrt{e^t + 1}) \cdot \frac{1}{2} (e^t + 1)^{-\frac{1}{2}} (e^t)$$

$$48. e^{2e^{y^3}} \cdot (2e^{y^3}) (3y^2)$$

$$49. -\frac{1}{2} (5x^4 + 2)$$

$$50. -12x^3 - 12x^2 - 6$$

$$51. 5z^4 + 20z^3 - 1$$

$$52. 2(\ln 3)z + \ln 4 e^z$$

$$53. 2 + \frac{1}{3} x^{-\frac{4}{3}} + 3^x \ln 3$$

$$54. 6x \cdot (e^x - 4) + (3x^2 + \pi)(e^x)$$

$$55. 2\theta \sin \theta + \theta^2 (\cos \theta + 2\cos \theta + 2\theta(-\sin \theta)) - 2\cos \theta$$

$$56. \frac{1}{2} (\cos(5\theta))^{-\frac{1}{2}} (-\sin(5\theta))(5) + 2\sin(6\theta) - \cos(6\theta)(6)$$

$$57. \cos((3\theta - \pi)^2) (2(3\theta - \pi))(3)$$

$$58. 3(x^2 + 5)^2 (2x) (3x^2 - 3)^2 + (x^2 + 5)^3 (2(3x^2 - 2))(6x)$$

$$59. \sec^2(\arctan(ke)) \cdot \frac{1}{(ke)^2} \cdot k$$

$$60. ke^{kt}(\sin at + \cos bt) + e^{kt}(a \cos at - b \sin bt)$$

$$61. (-4 - 6x)(6x^e - 3\pi) + (2 - 4x - 3x^2)(6e x^{e-1})$$

$$62. 4(\sin(2t) - \cos(3t))^3 (\cos(2t)(2) + \sin(3t)(3))$$

$$63. \cancel{3x} 0$$

$$64. (-2x + 6x^2)(6 - 4x + x^7) + (4 - x^2 + 2x^3)(-4 + 7x^6)$$

$$65. \left(-\frac{1}{x^2} + \frac{2}{x^3}\right)(2x^3 + 4) + \left(\frac{1}{x} - \frac{1}{x^2}\right)(6x^2)$$

$$66. \frac{1}{2}(5z)^{\frac{1}{2}}(5) + \frac{5}{2}z^{-\frac{1}{2}} - \frac{5}{2}z^{-\frac{3}{2}} + \frac{1}{2}(\sqrt{5})z^{-\frac{3}{2}}$$