

Math 1550 Answers to Homework—Even numbered problems

Chapter 13

§13.6 14.  $p = 2/3$  and  $q = 3600$ ;  $r'(3600) = c'(3600) = 1/3$

Chapter 14

§14.2 36.  $\frac{3}{4}y^4 - \frac{2}{3}y^3 + \frac{1}{6}e^y + C$ ; 40.  $\frac{3}{4}u^{4/3} + 2u^{1/2} + C$ ; 42.  $\frac{1}{8}x^8 + \frac{8}{7}x^7 + \frac{7}{5}x^5 + C$ ; 48.  $6e^u - \frac{2}{9}u^{9/2} - \frac{1}{4}u^4 + C$ ; 50.  $\frac{1}{20}x^4 - \frac{3}{10}x^2 + \frac{4}{5}x + C$ ; 52.  $\frac{1}{5}x^5 + x^2 - \frac{1}{x} + C$

§14.3 10.  $r = 15q - \frac{1}{30}q^2$ ; 12.  $r = 5000q - 3q^2 - \frac{3}{2}q^4$ ; 20.  $r = 100q - q^3$ ,  $p = 100 - q^2$ ,  $\eta(5) = -3/2$

§14.4 26.  $2 \ln|x + x^2 + 2x^3| + C$ ; 28.  $\ln|1 - x^2 + 3x^3| + C$ ; 36.  $\frac{7}{10} \ln|5t^2 - 6| + C$ ; 38.  $-\frac{1}{15} \frac{1}{(3x)^5} + C$ ; 40.  $-\frac{11}{2} \ln|3 - 2x| + C$ ; 42.  $\frac{2}{3}(2x - 1)^{3/2} + C$ ; 44.  $\frac{1}{4}(2x^3 + 9)^{2/3} + C$ ; 48.  $\frac{1}{3}e^{3y^2} + C$ ; 62.  $\frac{1}{4}u^4 + \frac{1}{6}e^{6-3u^2} + C$ ; 74.  $\frac{1}{6} \ln(3x^2 + 5) + \frac{1}{6(x^3+1)^2} + C$ ; 78.  $-\frac{4}{3}(\frac{1}{t} + 9)^{3/2} + C$

§14.5 2.  $\frac{3}{2}x^2 + \frac{5}{3} \ln|x| + C$ ; 4.  $\frac{2}{3}(x^2 + 1)^{3/4} + C$ ; 6.  $\ln|e^{x^2} - 2| + C$ ; 8.  $\frac{1}{\ln 5}5^t + C$ ; 10.  $e^x + \frac{x^{e+1}}{e+1} + \frac{e}{2}x^2 + e \ln|x| + C$ ; 12.  $x^2 + 15x + 72 \ln|x - 5| + C$

§14.6 4. 63; 6.  $6\frac{2}{3}$ ; 20. 410

§14.7 6.  $S_n = \frac{6n+4}{n}$

§14.8 16. 72; 24. 1; 26.  $\frac{243}{5}$ ; 30. 0; 32.  $6\frac{7}{16}$ ; 36. 20; 38.  $9\sqrt{2} - 6$ ; 44.  $-\frac{1}{12}$ ; 46.  $1/3$ ; 48. 1; 62. 9000

§14.10 20. 2; 24. 16; 32.  $\frac{16}{3}$ ; 34.  $\frac{5}{6}$

§14.11 24. 4.5; 26. 121.5; 30.  $\frac{5}{12}$ ; 34.  $\frac{64}{3}$ ; 38. (a)  $\frac{32}{3}$ , (b) 87.5%

§14.12 2.  $p_0 = 1300, q_0 = 30, CS = 18000, PS = 18000$ ; 4.  $p_0 = 1300, q_0 = 10, CS = 2000/3, PS = 1000$ ; 6.  $p_0 = 36, q_0 = 8, CS = 1024/3, PS = 64$ ; 8.  $p_0 = 10, q_0 = 300, CS = 5000/3, PS = 750$

Chapter 15

§15.1 4.  $-\frac{1}{5}xe^{-5x} - \frac{1}{25}e^{-5x} + C$ ; 6.  $\frac{1}{3}x^3 \ln x - \frac{1}{9}x^3 + C$ ; 8.  $-te^{-t} - e^{-t} + C$ ; 10.  $\frac{1}{2}(1 + 4x)^{3/2} - \frac{3}{2}(1 + 4x)^{1/2} + C$ ; 12.  $\frac{1}{4}(\ln(x + 1))^2 + C$ ; 14.  $-(x + 2)e^{-x} + C$ ; 20.  $x(\ln x)^2 - 2x \ln x + 2x + C$ ; 28.  $\frac{1}{2}x^4e^{x^2} - x^2e^{x^2} + e^{x^2} + C$

§15.7 2.  $\frac{1}{36}$ ; 4. divergent; 6. divergent; 8.  $1/5$

### Chapter 17

§17.2 6.  $g_x = 2(x+1) + 5y^3, g_y = 3(y-3)^2 + 15xy^2$ ; 8.  $g_w = \frac{2}{3}w(w^2+z^2)^{-2/3}, g_z = \frac{2}{3}z(w^2+z^2)^{-2/3}$ ; 10.  $h_u = \frac{8v^2(v^2-u^2)}{(u^2+v^2)^2}, h_v = \frac{16u^3v}{(u^2+v^2)^2}$ ; 16.  $z_x = (2x+3x^2+3y)e^{3x+4y}, z_y = (1+4x^2+4y)e^{3x+4y}$ ; 18.  $z_x = \frac{60x^2}{5x^3+2y^2}, z_y = \frac{40x^3+32y^2}{5x^3y+2y^3}$ ; 24.  $g_x = 2y^2z^6 - 8xy^3z^2 + 3yz, g_y = 4xyz^6 - 12x^2y^2z^2 + 3xz, g_z = 12xy^2z^5 - 8x^2y^3z + 3xy$ ; 30. 27; 34.  $0, -\frac{2}{e^2}$

§17.3 8.  $\frac{\partial q_A}{\partial p_A} = -1, \frac{\partial q_A}{\partial p_B} = -2, \frac{\partial q_B}{\partial p_A} = -2, \frac{\partial q_B}{\partial p_B} = -3$ , complementary; 10.  $P_l = 15.18l^{-0.54}k^{0.52}, P_k = 17.16l^{0.46}k^{-0.48}, P_l(1,1) = 15.18, P_k(1,1) = 17.16$

§17.4 6.  $\frac{\partial z}{\partial x} = \frac{z}{3z^2-x}; \frac{\partial z}{\partial y} = \frac{xz^2+9y^2x^2z}{3-xyz}$ ; 12.  $-1$

§17.5 4.  $f_x = (2x+y)(2x^2+2xy+y^2+1), f_{xy} = 6x^2+8xy+3y^2+1$ ; 6.  $f_x = \frac{2x}{x^2+y^2}, f_{xx} = \frac{2(y^2-x^2)}{(x^2+y^2)^2}, f_{xy} = \frac{-4xy}{(x^2+y^2)^2}$ ; 8.  $f_x = y^2z^3, f_{xz} = 3y^2z^2, f_{xy} = 2yz^3$ ; 10.  $\frac{\partial z}{\partial x} = \frac{1}{y(x^2+5)}, \frac{\partial^2 z}{\partial y \partial x} = -\frac{1}{y^2(x^2+5)}$ ; 14.  $f_{xy}(5,1) = f_{yx}(5,1) = 176$

§17.6 2.  $\frac{\partial z}{\partial r} = (2x+5y)(2r-2s) + (5x+14y), \frac{\partial z}{\partial s} = (2x+5y)(-2r) + (5x+14y)(-10s)$ ; 4.  $\frac{dz}{dt} = \frac{3t^2+16t+24}{2\sqrt{8x+y}}$ ; 6.  $\frac{dw}{dt} = \frac{-6x+4ty-2z}{x^2+y^2+x^2}$ ; 8.  $\frac{\partial z}{\partial r} = \frac{2rx+y}{\sqrt{x^2+y^2}}$ ; 10.  $\frac{\partial w}{\partial r} = (2rs^3yz + \frac{xz}{r-s} + \frac{xy\sqrt{s^2}}{2\sqrt{r}})e^{xyz}$

§17.7 2.  $(3, -2)$ ; 4.  $(-1, 1)$ ; 6.  $(1, -1, 2, 2)$ ; 8. relative maximum at  $(2, 4)$ ; 10. relative minimum at  $(6, -3)$ ; 14. relative minimum at  $(0, 0)$ ; no relative extremum at  $(-1/2, -1/4)$ ; 26. no maximum.

§17.8 4.  $(3, 3, 3)$ ; 8.  $(1, 1, 1)$ ; 10.  $(2, 0, 2)$ .