

HOFFMAN SEC 5.1 ANSWERS

CHAPTER 5 Section 1

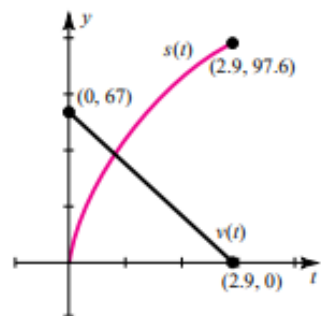
1.  $-3x + C$
3.  $\frac{x^6}{6} + C$
5.  $-\frac{1}{x} + C$
7.  $4\sqrt{t} + C$

9.  $\frac{5}{3}u^{3/5} + C$
11.  $t^3 - \frac{2\sqrt{5}}{3}t^{3/2} + 2t + C$
13.  $2y^{3/2} + y^{-2} + C$
15.  $\frac{e^x}{2} + \frac{2}{5}x^{5/2} + C$
17.  $\frac{u^{1.1}}{3.3} - \frac{u^{2.1}}{2.1} + C$
19.  $x + \ln x^2 - \frac{1}{x} + C$
21.  $-\frac{5}{4}x^4 + \frac{11}{3}x^3 - x^2 + C$
23.  $\frac{2}{7}t^{7/2} - \frac{2}{3}t^{3/2} + C$
25.  $\frac{1}{2}e^{2t} + 2e^t + t + C$

27.  $\frac{1}{3} \ln |y| - 10\sqrt{y} - 2e^{-y/2} + C$
29.  $\frac{2}{5}t^{5/2} - \frac{2}{3}t^{3/2} + 4t^{1/2} + C$
31.  $y = \frac{3}{2}x^2 - 2x - \frac{3}{2}$
33.  $y = \ln x^2 + \frac{1}{x} - 2$
35.  $f(x) = 2x^2 + x - 1$
37.  $f(x) = -\frac{1}{3}x^3 - \frac{1}{2}x^2 + \frac{31}{6}$
39.  $f(x) = \frac{x^4}{4} + \frac{2}{x} + 2x - \frac{5}{4}$
41.  $f(x) = -e^{-x} + \frac{x^3}{3} + 5$
43. \$22,360
45. \$646.20
47. 3,253
49. 10,128 people
51. a.  $18\frac{1}{3}$  (18 items)  
b.  $48\frac{1}{3}$  (48 items)
53. a.  $T(t) = 16 - 20e^{-0.35t}$   
b. 6.1°C  
c. 3.44 hours

55. a.  $P(q) = 100q - q^2 - 200$   
 b.  $q = 50$ ; \$2,300
57.  $c(x) = 0.9x + 0.2x^{3/2} + 10$
59. The car travels 199.89 feet before stopping, so the camel gets nudged.
61. a.  $f'(x)$  is maximized when  $x = 10$ ; 7 items per minute  
 b.  $f(x) = x + 0.6x^2 - 0.02x^3$   
 c.  $f'(20.8) = 0$ ;  $f(20.8) \approx 100$  items
63.  $v(r) = \frac{1}{2}a(R^2 - r^2)$
65. 20 meters
67.  $\int b^x dx = \int e^{x \ln b} dx = \frac{e^{x \ln b}}{\ln b} + C = \frac{b^x}{\ln b} + C$
69. a.  $v(t) = -23t + 67$ ;  $s(t) = -\frac{23}{2}t^2 + 67t$

b.



- c.  $v(t) = 0$  when  $t = 2.9$  sec and  $s(2.9) = 97.6$  ft;  
 $s(t) = 45$  ft when  $t \approx 0.77$  sec or 5.05 sec and  
 $v(0.78) \approx 49.30$  ft/sec while  $v(5.05) \approx -49.15$ .

CHAPTER 5 Section 2

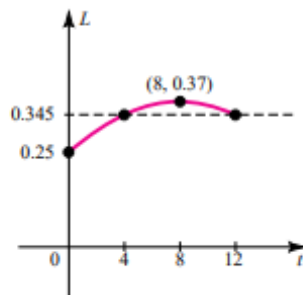
1. a.  $u = 3x + 4$   
    b.  $u = 3 - x$   
    c.  $u = 2 - t^2$   
    d.  $u = 2 + t^2$
3.  $\frac{1}{12}(2x + 6)^6 + C$
5.  $\frac{1}{6}(4x - 1)^{3/2} + C$
7.  $-e^{1-x} + C$
9.  $\frac{1}{2}e^{x^2} + C$
11.  $\frac{1}{12}(t^2 + 1)^6 + C$

13.  $\frac{4}{21}(x^3 + 1)^{7/4} + C$
15.  $\frac{2}{5} \ln |y^5 + 1| + C$
17.  $\frac{1}{26}(x^2 + 2x + 5)^{13} + C$
19.  $\frac{3}{5} \ln |x^5 + 5x^4 + 10x + 12| + C$
21.  $-\frac{3}{2} \left( \frac{1}{u^2 - 2u + 6} \right) + C$
23.  $\frac{1}{2}(\ln 5x)^2 + C$
25.  $\frac{-1}{\ln x} + C$
27.  $\frac{1}{2}[\ln(x^2 + 1)]^2 + C$
29.  $\ln |e^x - e^{-x}| + C$
31.  $\frac{1}{2}x - \frac{1}{4} \ln |2x + 1| + C$

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33.  $\frac{1}{10}(2x + 1)^{5/2} - \frac{1}{6}(2x + 1)^{3/2} + C$
35.  $2 \ln(\sqrt{x} + 1) + C$
37.  $y = -\frac{1}{6}(3 - 2x)^3 + \frac{9}{2}$
39.  $y = \ln|x + 1| + 1$
41.  $y = \frac{1}{2} \ln|x^2 + 4x + 5| - \frac{1}{2} \ln 2 + 3$
43.  $f(x) = \frac{1}{5} - \frac{1}{5}(1 - 2x)^{5/2}$
45.  $f(x) = \frac{3}{2} - \frac{1}{2}e^{4-x^2}$
47. a.  $x(t) = -\frac{4}{9}(3t + 1)^{3/2} + \frac{40}{9}$   
    b.  $x(4) = -16.4$   
    c.  $t = 0.4$
49. a.  $x(t) = \sqrt{2t + 1} - 1$   
    b.  $x(4) = 2$   
    c.  $t = \frac{15}{2}$
51. a.  $C(q) = (q - 4)^3 + 64 + k$ , where  $k$  is the overhead  
    b. \$1,500

53. 2.3 meters
55. a.  $R(x) = 50x - 175e^{-0.01x^2} + 175$   
b. \$50,175
57. a.  $C(t) = \frac{1}{e^{0.01t} + 1}$   
b.  $0.3543 \text{ mg/cm}^3$ ;  $0.1419 \text{ mg/cm}^3$   
c. 294 minutes
59. a.  $L(t) = 0.03\sqrt{-t^2 + 16t + 36} + 0.07$ ; at  $t = 8$  (3:00 P.M.); 0.37 parts per million  
b. The ozone level at 11:00 A.M. ( $t = 4$ ) is  $L(4) = 0.345$ . The same level occurs at  $t = 12$  (7:00 P.M.).



61. a.  $p(x) = \frac{300}{\sqrt{x^2 + 9}} + 15$   
b. \$66.45; \$115  
c. 265
63. Profit declines by \$93,733.
65.  $\frac{3}{7}(x^{2/3} + 1)^{7/2} - \frac{3}{5}(x^{2/3} + 1)^{5/2} + C$
67.  $e^x + 1 - \ln(e^x + 1) + C$

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CHAPTER 5 Section 3

1. 15
3.  $\frac{95}{2}$
5.  $\frac{6}{5}$
7.  $-\frac{6}{5}$
9.  $3 - \frac{4}{e}$
11. 1.95
13. 144

15.  $\frac{8}{3} + \ln 3 \approx 3.7653$
17.  $\frac{2}{9}$
19. 3.2
21.  $\frac{4}{3}$
23.  $\frac{7}{6}$
25.  $e$
27.  $\frac{8}{3}$
29.  $e^3 - e^2$
31. -20
33. 0
35. 5
37. 3
39.  $\frac{33}{5}$
41.  $\frac{112}{9}$
43. 4
45.  $\frac{3}{2} \ln 3 \approx 1.6479$
47.  $V(5) - V(0)$
49. \$480
51. 0.75 ppm
53. About 98 people

55. \$75
57.  $1,500\left(\frac{3}{2} + \frac{5}{4} \ln \frac{11}{9}\right) \approx 2,626$  telephones
59. a. -\$48,036.33  
b. \$28,546.52
61. The concentration decreases by 0.8283 mg/cm<sup>3</sup>.
63. A decrease of \$1,870
65.  $2 \ln 2 \approx 1.386$  grams
67.  $8\sqrt{11} - 8\sqrt{6}$  or about 7 facts
69. 96 ft
71. a.  $\frac{\pi}{4}$   
b.  $\frac{\pi}{4}$ ; part of the area under the circle  
 $(x - 1)^2 + y^2 = 1$

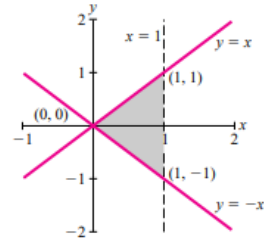
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## CHAPTER 5 Section 4

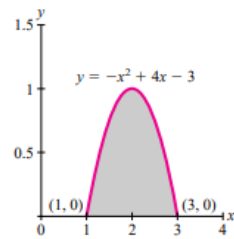
1.  $\frac{5}{12}$

3.  $2 \ln 2 - \frac{1}{2}$

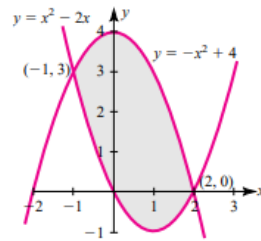
5. Area = 1



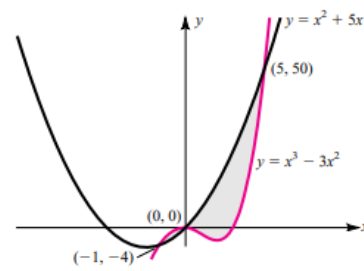
7. Area =  $\frac{4}{3}$



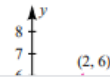
11. Area = 9



13. Area =  $\frac{443}{6}$



15. Area = 18

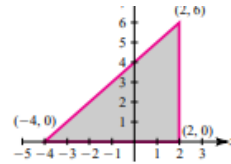
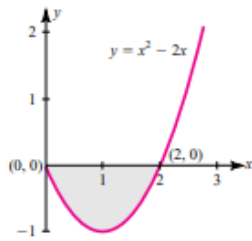


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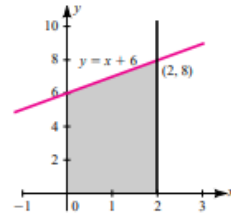
#15 continued below

#15 continued from above

9. Area =  $\frac{4}{3}$



17. Area = 14



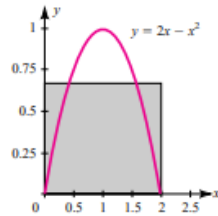
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19. -2

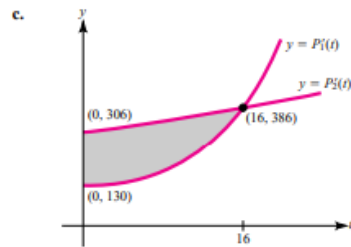
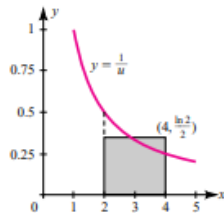
21.  $\frac{3}{2}(e - \frac{1}{e})$

23.  $\frac{\ln 5 - \ln 3}{\ln 3}$

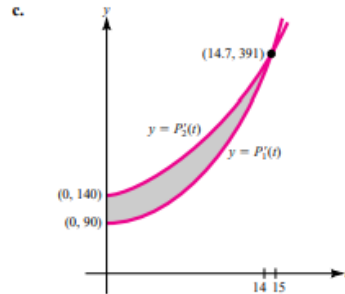
25. Average value =  $\frac{2}{3}$



27. Average value =  $\frac{\ln 2}{2}$



45. a. 14.7 years  
b. \$582,221



47. 0.412 million (412,000)

49.  $\frac{1}{40}$  mg/cm<sup>3</sup>

51. a. 0°C