

Lessons 7-1 & 7-4 HW Key

Lesson 6-1 HW Answers

pp. 335 & 336 / 4, 7, 11, 24, 32

4.  $\frac{dy}{dx} = \frac{1}{x} - \frac{1}{x^2} \quad (x > 0)$       7.  $\frac{dy}{dx} = 3t^2 \cos(t^3)$   
 $= x^{-1} - x^{-2}$

$y = \sin(t^3) + C$

$y = \ln x - \frac{x^{-1}}{-1} + C$

$y = \ln x + \frac{1}{x} + C$

11.  $\frac{dy}{dx} = 3 \sin x$  and  $f(0) = 2$       24.  $G'(s) = \sqrt[3]{\tan s}$  and  $G(0) = 4$

$y = -3 \cos x + C$

$2 = -3 \cos(0) + C$

$2 = -3 \cdot 1 + C$

$2 = -3 + C$

$C = 5$

$y = -3 \cos x + 5$

$\int_0^5 \sqrt[3]{\tan s} ds = G(5) - G(0)$

$\int_0^5 \sqrt[3]{\tan s} ds = G(5) - 4$

$4 + \int_0^5 \sqrt[3]{\tan t} dt = G(5)$

32.  $\frac{dy}{dx} = 2x - y$

$\frac{dy}{dx}   (x,y)$	-1	0	1	2
-1	-1	-2	-3	-4
0	1	0	-1	-2
1	3	2	1	0



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p. 336/35-40 (Just do the matching part.)

$$35. \frac{dy}{dx} = x \quad [C] \Rightarrow \frac{dy}{dx} \Big|_{(0,y)} = 0$$

$$36. \frac{dy}{dx} = y \quad [E] \Rightarrow \frac{dy}{dx} \Big|_{(x,0)} = 0$$

$$37. \frac{dy}{dx} = x - y \quad [A] \Rightarrow \frac{dy}{dx} = 1 \text{ at } (1,0) (2,1) (3,2)$$

$$38. \frac{dy}{dx} = y - x \quad [D] \Rightarrow \frac{dy}{dx} = 1 \text{ at } (0,1) (1,2) (2,3)$$

$$39. \frac{dy}{dx} = \frac{-y}{x} \quad [B] \Rightarrow \frac{dy}{dx} = 0 \text{ when } y = 0 \\ \text{undefined when } x = 0$$

$$40. \frac{dy}{dx} = \frac{-x}{y} \quad [F] \Rightarrow \frac{dy}{dx} = 0 \text{ when } x = 0 \\ \text{undefined when } y = 0$$

Lessons 7-1 & 7-4 HW Key

Lesson 7-4 HW Answers

pp. 364 & 365 / 1, 4, 5, 9, 11, 21, 27

1.  $\frac{dy}{dx} = \frac{x}{y}$   $f(1) = 2$

$y dy = x dx$

$\int y dy = \int x dx + C$

$\frac{1}{2}y^2 = \frac{1}{2}x^2 + C$

$\frac{1}{2} \cdot 2^2 = \frac{1}{2} \cdot 1^2 + C$

$2 = \frac{1}{2} + C$

$1.5 = C$

$\frac{1}{2}y^2 = \frac{1}{2}x^2 + \frac{3}{2}$

$y^2 = x^2 + 3$

$y = \pm \sqrt{x^2 + 3}$

$y = \sqrt{x^2 + 3}$  ← pos. b/c of (1,2)

4.  $\frac{dy}{dx} = 2xy$   $f(0) = 3$

$\frac{1}{y} \cdot dy = 2x dx$

$\int \frac{1}{y} dy = \int 2x dx + C$

$\ln|y| = x^2 + C$

$\ln 3 = 0 + C$

$C = \ln 3$

$\ln|y| = (x^2 + \ln 3)$

$e^{\ln|y|} = e^{(x^2 + \ln 3)} = e^{x^2} \cdot e^{\ln 3}$

$y = e^{x^2} \cdot 3$

$y = 3e^{x^2}$

5.  $\frac{dy}{dx} = (y+5)(x+2)$   $f(0) = 1$

$\frac{1}{y+5} \cdot dy = (x+2) dx$

$\int \frac{1}{y+5} dy = \int (x+2) dx$

$\ln|y+5| = \frac{1}{2}x^2 + 2x + C$

$\ln 6 = C$

$(\ln|y+5|) = (\frac{1}{2}x^2 + 2x + \ln 6)$

$e^{\ln|y+5|} = e^{\frac{1}{2}x^2 + 2x} \cdot e^{\ln 6}$

$y = -5 \pm 6e^{\frac{1}{2}x^2 + 2x}$

$y = -5 + 6e^{\frac{1}{2}x^2 + 2x}$

← b/c of  $f(0) = 1$

9.  $\frac{dy}{dx} = -2xy^2$   $f(1) = .25$

$\frac{1}{y^2} \frac{dy}{dx} = -2x dx$

$\int \frac{1}{y^2} \frac{dy}{dx} = \int -2x dx$

$-\frac{1}{y} = -x^2 + C$

$-\frac{1}{.25} = -1 + C$

$-4 = -1 + C$

$C = -3$

$y \left(-\frac{1}{y}\right) = (-x^2 - 3)y$

$-1 = (-x^2 - 3)y$

$y = \frac{-1}{-x^2 - 3} = \frac{1}{x^2 + 3}$

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11.  $y(t) = 100e^{1.5t}$

21.  $\frac{\ln 2}{0.0077} \approx 90 \text{ yrs}$

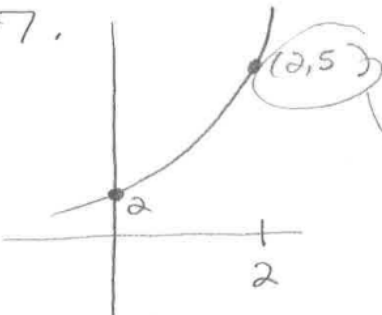
$$\frac{dy}{dt} = -0.0077dt$$

$$\int \frac{1}{y} dy = \int -0.0077 dt$$

$$\ln y = -0.0077t$$

$$t \approx \frac{\ln \frac{1}{2}}{-0.0077} \approx \boxed{90 \text{ years}}$$

27.



$y = y_0 e^{kt}$   $y(0) = 2$   
 $y = 2e^{kt}$   
 $5 = 2e^{k \cdot 2}$   
 $\frac{5}{2} = e^{2k}$   
 $\ln \frac{5}{2} = 2k$   
 $\frac{\ln \frac{5}{2}}{2} = k$

$y = 2e^{\frac{1}{2} \ln(\frac{5}{2})t}$   
 or  
 $y \approx 2e^{0.458t}$