

5B.2 p. 366 (1-7 odds, 13, 17, 19, 21, 23, 25)

1. $\frac{dy}{dx} = x + 2$

$\int dy = \int (x+2) dx$

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

3. $\frac{dy}{dx} = y + 2$

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

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

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

$e^{\ln|y+2|} = e^{x+C}$

$y+2 = Ce^x$

$y = Ce^x - 2$

5. $\frac{dy}{dx} = \frac{5x}{y}$

$y dy = 5x dx$

$\int y dy = \int 5x dx$

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

$y^2 = 5x^2 + 2C$

$y^2 = 5x^2 + C_1$

$y^2 - 5x^2 = C_1$

7. $\frac{dy}{dx} = \sqrt{x} y$

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

$\ln|y| = \frac{2}{3}x^{3/2} + C$

$e^{\ln|y|} = e^{\frac{2}{3}x^{3/2} + C}$

$y = Ce^{\frac{2}{3}x^{3/2}}$

13. $\frac{dN}{ds} = k(250-s)$

$dN = k(250-s) ds$

$\int dN = \int k(250-s) ds$

$N = k \int (250-s) ds$ $u = 250-s$

$du = -ds$

$N = -k \int -(250-s) ds$

$N = -k \frac{(250-s)^2}{2} + C$

$N = -\frac{k}{2}(250-s)^2 + C$

17. $\frac{dy}{dt} = \frac{1}{2}t$ (0, 10)

$\int dy = \int \frac{1}{2}t dt$

$10 = \frac{1}{4}(0)^2 + C$

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

$10 = C$

$y = \frac{1}{4}t^2 + C$

$y = \frac{1}{4}t^2 + 10$

19. $\frac{dy}{dt} = -\frac{1}{2}y$ (0, 10)

$\frac{1}{y} dy = -\frac{1}{2} dt$

$10 = Ce^{-1/2(0)}$

$\int \frac{1}{y} dy = \int -\frac{1}{2} dt$

$10 = C$

$\ln|y| = -\frac{1}{2}t + C$

$y = e^{-1/2t + C}$

$y = 10e^{-1/2t}$

$y = Ce^{-1/2t}$

21. $\frac{dy}{dx} = ky$

(0, 4)

$\frac{1}{y} dy = k dx$

$4 = Ce^{k(0)} \Rightarrow C = 4$

$\int \frac{1}{y} dy = \int k dx$

$y = 4e^{kx}$

$\ln|y| = kx + C$

$y = e^{kx + C}$

(3, 10)

$10 = 4e^{k(3)}$

$y = Ce^{kx}$

$\frac{5}{2} = e^{3k}$

$\ln(\frac{5}{2}) = 3k$

$\frac{1}{3} \ln(\frac{5}{2}) = k$

$y = 4e^{\frac{1}{3} \ln(\frac{5}{2}) x}$

$y = 4e^{\frac{1}{3} \ln(\frac{5}{2}) \cdot 6} = 25$

23. $\frac{dy}{dt} = kV$ (0, 20,000) (4, 12500)

$\frac{1}{V} dV = k dt$ $20,000 = Ce^{k(0)}$ $12500 = 20,000e^{k(4)}$

$\ln|V| = kt + C$ $20000 = 0$ $0.625 = e^{4k}$

$V = e^{kt+C}$

$V = Ce^{kt}$ $V = 20000e^{kt}$

$\ln(0.625) = 4k$

$\frac{1}{4} \ln(0.625) = k$

$k = -0.1175$

$V = 20000e^{\frac{1}{4} \ln(0.625)t}$

$V = 20000e^{\frac{1}{4} \ln(0.625) \cdot 6}$

$V = 9882.118$

25. $y = Ce^{kt}$ (0, $\frac{1}{2}$) (5, 5)

$\frac{1}{2} = Ce^{k(0)}$

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

$y = \frac{1}{2} e^{kt}$ $5 = \frac{1}{2} \cdot e^{k(5)}$

$10 = e^{5k}$

$\ln 10 = 5k$

$\frac{1}{5} \ln 10 = k$

$y = \frac{1}{2} e^{\frac{1}{5} \ln 10 \cdot x}$

OR

$y = \frac{1}{2} e^{0.4605x}$