Worksheet 95 Answers

1) $\frac{dy}{dx} = xy^2$

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

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

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

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

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

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

2) $\frac{dy}{dx} = 9y$

$\frac{1}{y}dy = 9\,dx$

$\ln|y| + C = 9x + C$

$\ln|y| = 9x + C$

$|y| = e^{9x+C}$

$|y| = e^{9x} \cdot e^{C}$

$|y| = Ce^{9x}$

$y = \pm Ce^{9x}$

3) $\frac{dy}{dx} = y\cos x$

$\frac{1}{y}dy = \cos x\,dx$

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

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

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

$|y| = e^{\sin x} \cdot e^{C}$

$|y| = Ce^{\sin x}$

$y = \pm Ce^{\sin x}$

4) $\frac{dy}{dx} = 2\sqrt{x}$

$dy = 2x^{1/2}dx$

$y + C = \frac{4}{3}x^{3/2} + C$

$y = \frac{4}{3}x^{3/2} + C$

5) $\frac{dy}{dx} = \frac{x}{y}$ $\quad y=2,\ x=1$

$y\,dy = x\,dx$

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

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

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

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

$\frac{3}{2} = C$

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

$y^2 = x^2 + 3$

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

6) $\frac{dy}{dx} = -\frac{x}{y}$ $y=3$, $x=4$

$y\,dy = -x\,dx$

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

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

$\frac{1}{2}(3)^2 = -\frac{1}{2}(4)^2 + C$

$\frac{9}{2} = -8 + C$

$\frac{25}{2} = C$

$\frac{1}{2}y^2 = -\frac{1}{2}x^2 + \frac{25}{2}$

$y^2 = -x^2 + 25$

$y = \sqrt{-x^2+25}$; D: $(-5, 5)$

$y \neq 0$

8) $\frac{dy}{dx} = 2xy$ $y=3$ when $x=0$

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

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

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

$\ln 3 = 0^2 + C$

$\ln 3 = C$

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

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

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

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

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

7) $\frac{dy}{dx} = \frac{y}{x}$ $y=2$; $x=2$

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

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

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

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

$0 = C$

$\ln|y| = \ln|x|$

$|y| = |x|$

$y = x$; $(0, \infty)$

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

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

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

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

$\ln|6| = \frac{1}{2}(0) + 2(0) + C$

$\ln 6 = C$

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

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

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

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

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