

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

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

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

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

$$2^2 = 1^2 + C$$

$$C = 3$$

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

$$\textcircled{3} \quad \frac{dy}{dx} = \frac{y}{x}$$

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

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

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

$$0 = C$$

$$y = x$$

$$\textcircled{5} \quad \frac{dy}{dx} = (y+5)(x+2)$$

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

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

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

$$1 = C e^0 - 5$$

$$C = 6$$

$$\textcircled{7} \quad \frac{dy}{dx} = (\cos x) e^{y+\sin x}$$

$$= (\cos x) \cdot e^y \cdot e^{\sin x}$$

$$\frac{1}{e^y} dy = \cos x \cdot e^{\sin x}$$

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

$$-1 = 1 + C$$

$$C = -2$$

$$y = -\ln(2 - e^{\sin x})$$

$$\textcircled{9} \quad \frac{dy}{dx} = -2xy^2$$

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

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

$$-\frac{1}{y} = -1 + C$$

$$C = -3$$

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

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

Das 328 QR #1.9

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$$\frac{dy}{dx} = \frac{4\sqrt{y} \ln x}{x}, \quad y(e) = 1$$

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$$\frac{1}{4\sqrt{y}} dy = \frac{\ln x}{x} dx$$

$$\frac{1}{4} \int y^{-1/2} dy = \int \frac{\ln x}{x} dx \quad \begin{cases} u = \ln x \\ du = \frac{1}{x} dx \end{cases}$$

$$\frac{1}{4} \cdot 2 \cdot y^{1/2} = \frac{1}{2} u^2 + C$$

$$\frac{1}{2} \sqrt{y} = \frac{1}{2} (\ln x)^2 + C$$

$$\frac{1}{2} \sqrt{y} = \frac{1}{2} (\ln e)^2 + C$$

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

$$C = 0$$

$$y = [(\ln x)^2]^2 = (\ln x)^4$$

Das 328 QR #1.9

$$\textcircled{1} y = x^3 \sin 2x$$

$$\frac{dy}{dx} = 3x^2 \cos 2x + 3x^2 \sin 2x$$

$$\textcircled{2} y = e^{2x} \ln(3x+1)$$

$$\frac{dy}{dx} = \frac{3e^{2x}}{3x+1} + 2e^{2x} \ln(3x+1)$$

$$\textcircled{3} y = \tan^{-1}(2x)$$

$$\frac{dy}{dx} = \frac{2}{1+4x^2}$$

$$\textcircled{4} y = \sin^{-1}(x+3)$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-(x+3)^2}}$$

$$\textcircled{5} y = \tan^{-1} 3x$$

$$\tan y = 3x$$

$$x = \frac{1}{3} \tan y$$

$$\textcircled{6} y = \cos^{-1}(x+1)$$

$$\cos y = x+1$$

$$x = \cos y - 1$$

$$\textcircled{7} A = \int_0^1 \sin(\pi x) dx$$
$$= -\frac{1}{\pi} \cos(\pi x) \Big|_0^1$$

$$= -\frac{1}{\pi}(-1) + \frac{1}{\pi}(1)$$

$$= \frac{2}{\pi}$$

$$\textcircled{8} \frac{dy}{dx} = e^{2x}$$

$$dy = e^{2x} dx$$

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