

$$(29) \quad \frac{dy}{dx} + 2y = 0 \quad y(\ln 2) = 3$$

$$y' = -2y$$

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

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

$$e$$

$$y = e^{-2x+C} = e^{-2x} e^C = c_2 e^{-2x}$$

$$y = c e^{-2x} \quad \text{general solution}$$

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

$$= c \left[e^{(\ln 2)} \right]^{-2}$$

$$= c \cdot 2^{-2}$$

$$3 = \frac{1}{4} c$$

$$c = 12$$

$$c = \frac{3}{e^{-2 \ln 2}} = 12$$

$$y = 12 e^{-2x}$$

particular solution

$$(30) \quad y' - 2y + 4 = 0$$

$$y(1) = 4$$

$$y' = 2y - 4$$

$$\frac{dy}{2y-4} = dx$$

$$\frac{1}{2} \int \left(\frac{dy}{y-2} \right) = \int dx$$

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

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

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

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

$$y = ce^{2x} + 2$$

$$4 = ce^2 + 2$$

$$2 = ce^2$$

$$c = \frac{2}{e^2}$$

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

$$y = 2e^{2x-2} + 2 -$$

$$(31) \quad yy' = xe^{-y^2}$$

$$) e^{y^2} y dy = \int x dx$$

$$\frac{1}{2} \int e^u du = \frac{1}{2} e^{y^2}$$

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

$$e^{y^2} = x^2 + C$$

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

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

$$-1 = -\sqrt{\ln(0^2 + C)}$$

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

$$y(0) = -1$$

$$u = y^2$$

$$du = 2y dy$$

$$\frac{1}{2} du = y dy$$

genl. soln.

$$C = e$$

particular
soln

$$(32) \quad y^2 \frac{dy}{dx} = x^{-3}$$

$$\int y^2 dy = \int x^{-3} dx$$

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

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

$$y = \sqrt[3]{-\frac{3}{2} x^{-2} + C}$$

$$y(2) = 0$$

$$0 = \sqrt[3]{-\frac{3}{2} \cdot \frac{1}{2^2} + C}$$

$$C = 3/8$$

$$y = \sqrt[3]{-\frac{3}{2} x^{-2} + \frac{3}{8}}$$

particular

gen. soln.