

4.42

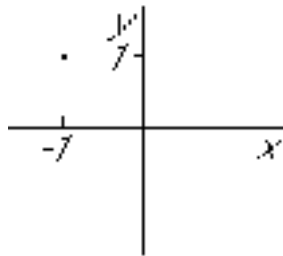
1 4.42, §1 Asked

Solve:

$$\frac{dy}{dx} = -(x^2 + 1)y \quad y = 1 \text{ at } x = -1$$

2 4.42, §2 Solution

$$\frac{dy}{dx} = -(x^2 + 1)y \quad y = 1 \text{ at } x = -1$$



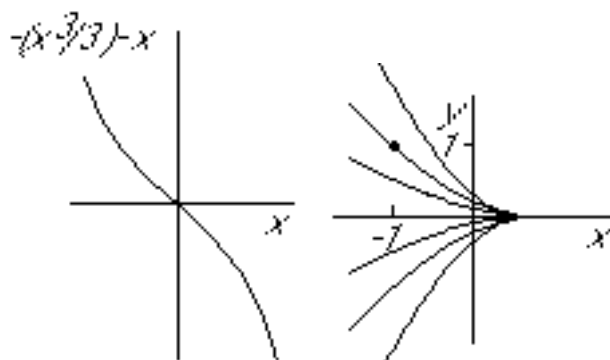
Solve the O.D.E. first:

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

$$\ln |y| = -\frac{1}{3}x^3 - x + C$$

$$y = \pm e^C e^{-\frac{1}{3}x^3 - x}$$

$$y = D e^{-\frac{1}{3}x^3 - x}$$



Since the additional condition is $y = 1$ at $x = -1$, substitute in $y = 1$ and $x = -1$ to get D:

$$1 = De^{\frac{1}{3}+1}$$

So, at any x :

$$y = e^{-\frac{1}{3}x^3 - x - \frac{4}{3}}$$