$$x^* = +1 \atop x^* = -1 \; (stable) \qquad x^* = 0 \; (unable.)$$

$$\dot{x} = x - x^3$$

$$\int dt = \int \frac{1}{x - x^3} dx$$

$$\int dt = \int \frac{1}{x(1 - x^2)} dx$$

$$t + C_1 = \int \frac{1}{x} dx + \frac{1}{2} \int \frac{1}{x+1} dx - \frac{1}{2} \int \frac{1}{x-1} dx$$

$$t + C_1 = -\frac{1}{2} \ln(x^2 - 1) + \ln(x)$$

$$2t + 2C_1 = \ln\left(\frac{x^2}{1 - x^2}\right)$$

$$e^{2t + 2C_1} = \frac{x^2}{1 - x^2}$$

$$\therefore X(t) = \pm \frac{C_1 e^t}{\sqrt{C_1^2 e^{2t} + 1}}$$