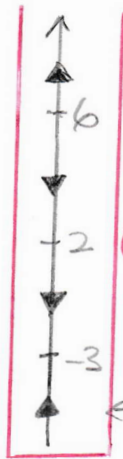


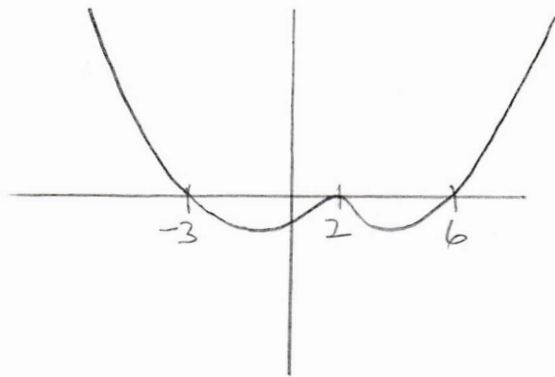
[2][a]



2

← SINCE $\frac{dy}{dx} \Big|_{y=-5} = f(-5) > 0$

[b]



GRADED
BY ME

[c] [i] -3 ① [ii] 6 ①

[d] STABLE ①

$$[3] \quad \frac{dA}{dt} = \underbrace{3(5) + 4(7)}_{(2)} - 20 \left(\frac{A}{400 - 8t} \right) \quad (2\frac{1}{2}) \quad 5+7-20 = -8 \text{ GALLONS PER MINUTE}$$

$$= \left[43 - \frac{20A}{400 - 8t} \quad \text{or} \quad 43 - \frac{5A}{100 - 2t} \right] (1)$$

$$\text{IF } \left[400 - 8t \geq 0 \right] (1\frac{1}{2})$$

$$\text{IE. } \left[t \leq 50 \right] (1\frac{1}{2})$$

NO DE IF $t > 50$ SINCE
NO SOLUTION/SALT IN TANK

$$A(0) = \left[400(2) = 800 \right] (1)$$

$$[4][a] \quad y(2) = \frac{1}{2} \tan^{-1} 1 = \frac{1}{2} \left(\frac{\pi}{4} \right) = \frac{\pi}{8} \quad (1)$$

$$y' = \frac{1}{2} \frac{1}{1 + \left(\frac{x}{2}\right)^2} \cdot \frac{1}{2} = \frac{1}{4+x^2} \quad (1)$$

$$y'(2) = \frac{1}{4+4} = \frac{1}{8} \quad (1)$$

$$y'' = - \frac{2x}{(4+x^2)^2} \quad (2)$$

$$y'' + 2x(y')^2 = - \frac{2x}{(4+x^2)^2} + 2x \left(\frac{1}{4+x^2} \right)^2 = 0 \quad (1)$$

$$y = \frac{1}{2} \tan^{-1} \frac{x}{2} \quad \text{IS A SOLUTION} \quad (1) \quad (2)$$

[b] E+U DOES NOT APPLY SINCE THE IVP IS 2ND ORDER (1)
AND E+U ONLY APPLIES TO 1ST ORDER IVPs

$$[5] [a] y' = 2 \left(\frac{2}{3}x + C \right)^2 \left(\frac{2}{3} \right) = 2 \left(\frac{2}{3}x + C \right)^2$$

$$(y')^3 = 8 \left(\frac{2}{3}x + C \right)^6 = 8y^2 = 8 \left(\frac{2}{3}x + C \right)^6$$

$$[b] 0 = (4 + C)^3 \rightarrow C = -4$$

$$y = \left(\frac{2}{3}x - 4 \right)^3$$

$$[c] y' = 0$$

$$(y')^3 = 0 = 8y^2 = 0$$

$$[d] y' = 2y^{\frac{2}{3}} = f(x, y)$$

$$f_y = \frac{4}{3} y^{-\frac{1}{3}} = \frac{4}{3 \sqrt[3]{y}}$$

IS NOT CONTINUOUS AROUND $(6, 0)$
SINCE f_y DNE IF $y = 0$