

AH Weekly HW 3

1. $x^4 + y^4 + 9x - 6y = 14$

$$4x^3 + 4y^3 \frac{dy}{dx} + 9 - 6 \frac{dy}{dx} = 0 \quad \checkmark$$

$$4y^3 \frac{dy}{dx} - 6 \frac{dy}{dx} = -4x^3 - 9$$

$$\frac{dy}{dx}(4y^3 - 6) = -4x^3 - 9$$

$$\frac{dy}{dx} = \frac{-4x^3 - 9}{4y^3 - 6}$$

$$A(1,2) = \frac{dy}{dx} = \frac{-4 - 9}{4(8) - 6}$$

$$= \frac{-13}{26}$$

$$= -\frac{1}{2} \quad \checkmark$$

$$y - b = m(x - a)$$

$$y - 2 = -\frac{1}{2}(x - 1) \quad \checkmark$$

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

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

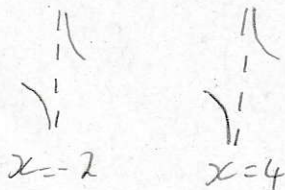
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2. a) $y = \frac{4x - 3}{x^2 - 2x - 8}$
 $= \frac{4x - 3}{(x + 2)(x - 4)}$

Vertical asymptotes @

$$x + 2 = 0, \quad x - 4 = 0$$

$$x = -2 \quad x = 4 \quad \checkmark$$



As $x \rightarrow -2^-$, $y \rightarrow -\infty$
 $x \rightarrow -2^+$, $y \rightarrow +\infty$
 $x \rightarrow 4^-$, $y \rightarrow -\infty$ \checkmark
 $x \rightarrow 4^+$, $y \rightarrow +\infty$

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b) i) Intersects x-axis when $y = 0$:

$$\frac{4x - 3}{x^2 - 2x - 8} = 0$$

$$4x - 3 = 0$$

$$4x = 3$$

$$x = \frac{3}{4} \quad \checkmark$$

Intersects at $(\frac{3}{4}, 0)$ \therefore Statement

(i) is false.

(ii) $y = \frac{4x}{x^2} - \frac{3}{x^2}$ \checkmark

$$\frac{x^2}{x^2} - \frac{2x}{x^2} - \frac{4}{x^2}$$

$$= \frac{4}{x} - \frac{3}{x^2}$$

$$1 - \frac{2}{x} - \frac{3}{x^2}$$

As $x \rightarrow \pm \infty$, $\frac{4}{x}, \frac{2}{x}, \frac{3}{x^2}, \frac{3}{x^2} \rightarrow 0$

$$\therefore y \rightarrow \frac{0}{1} = 0$$

\therefore The line $y = 0$ is an asymptote, so statement (2) is true.

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