

There are 3 questions worth 5 points each.

You MUST SHOW YOUR WORK for full credit. Good luck!

- (1) (5 Points) Write an equation of the line that passes through the following points. Then use the equation to sketch the graph.

$$\left(\frac{7}{8}, \frac{3}{4}\right), \left(\frac{5}{4}, -\frac{1}{4}\right)$$

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{-\frac{1}{4} - \frac{3}{4}}{\frac{5}{4} - \frac{7}{8}} = \frac{-1}{\frac{10}{8} - \frac{7}{8}} = \frac{-1}{\frac{3}{8}} = -\frac{8}{3}$$

point slope: $y - y_1 = m(x - x_1)$

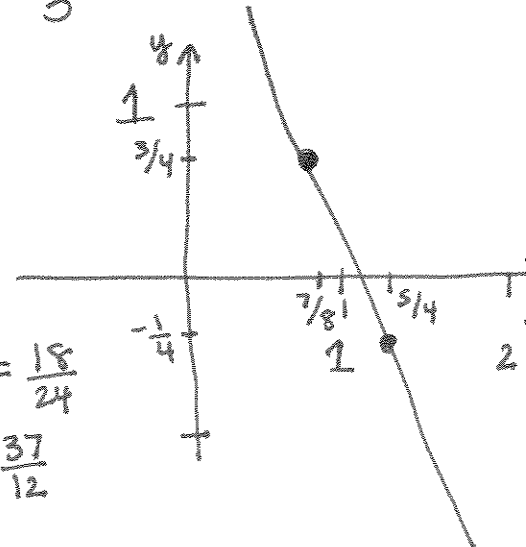
$$y - \frac{3}{4} = -\frac{8}{3}\left(x - \frac{7}{8}\right)$$

$$y - \frac{3}{4} = -\frac{8}{3}x + \frac{56}{24}$$

$$y = -\frac{8}{3}x + \frac{56}{24} + \frac{3}{4}, \quad \frac{3}{4} = \frac{18}{24}$$

$$y = -\frac{8}{3}x + \frac{74}{24}, \quad \frac{74}{24} = \frac{37}{12}$$

$$\boxed{y = -\frac{8}{3}x + \frac{37}{12}}$$



- (2) (5 Points) Evaluate the difference quotient and simplify the result.

Let $f(x) = \frac{1}{x+4}$, evaluate: $\frac{f(x+\Delta x) - f(x)}{\Delta x}$

$$f(x+\Delta x) = \frac{1}{x+\Delta x+4} \quad f(x) = \frac{1}{x+4}$$

$$\frac{f(x+\Delta x) - f(x)}{\Delta x} = \frac{\frac{1}{x+\Delta x+4} - \frac{1}{x+4}}{\Delta x}$$

$$= \frac{x+4 - (x+\Delta x+4)}{(x+4)(x+\Delta x+4)\Delta x}$$

$$= \frac{\cancel{x+4} - \cancel{x} - \Delta x - \cancel{4}}{\Delta x (x+4)(x+\Delta x+4)}$$

$$\boxed{= \frac{-1}{(x+4)(x+\Delta x+4)} \quad \text{for } \Delta x \neq 0}$$