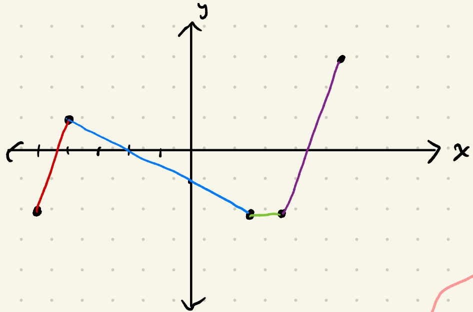
AB. 0100. LESSON 2 GRAPH BLACK 4



Pt slope: pt $(-5,-2)$
slope : $m = 3$

$$y + 2 = 3(x+5)$$
$$y = 3x + 15 - 2$$
$$y = 3x + 13$$

A]
$$f(x) = \begin{cases} 3x + 13 & ; \ -5 \le x \le -4 \\ -\frac{1}{2}x - 1 & ; \ -4 < x \le 2 \\ -2 & ; \ 2 < x \le 3 \\ \frac{5}{2}x - \frac{19}{2} & ; \ 3 < x \le 5 \end{cases}$$

NOTE: at $x = -4$ only one equation has an equal on the condition ... same for $x = 2, x = 3$

pt: $(3,-2)$
m: $\frac{5}{2}$

$$y + 2 = \frac{5}{2}(x-3)$$
$$y = \frac{5}{2}x - \frac{15}{2} - 2$$
$$y = \frac{5}{2}x - \frac{19}{2}$$

pt: $(-4, 1)$
m: $-1/2$

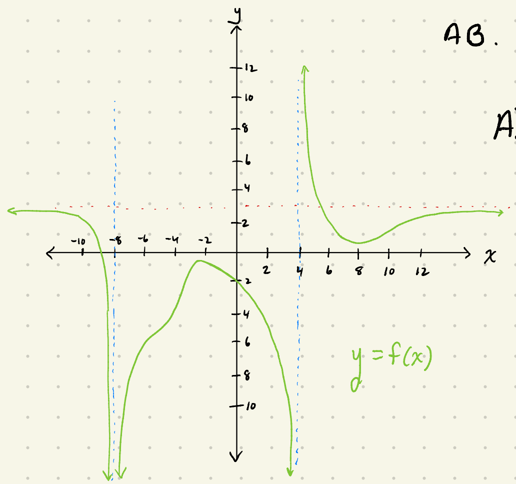
$$y - 1 = -\frac{1}{2}(x+4)$$
$$y = -\frac{1}{2}x - 2 + 1$$
$$y = -\frac{1}{2}x - 1$$

B]
$$f'(x) = \begin{cases} 3 & ; \ -5 \le x < -4 \\ -\frac{1}{2} & ; \ -4 < x < 2 \\ 0 & ; \ 2 < x < 3 \\ \cancel{2}\ 5/2 & ; \ 3 < x \le 5 \end{cases}$$

* NOTE NO EQUAL SIGNS AT $x = -4, 2, 3$ because at these x-values we have sharp transition corners and so there is no slope at $x = -4, 2, 3$

C]
$$\left.\begin{array}{lll} 3x + 13 = 0 & \rightarrow & x = -13/3 \\ -\frac{1}{2}x - 1 = 0 & \rightarrow & x = -2 \\ \frac{5}{2}x - \frac{19}{2} = 0 & \rightarrow & x = 19/5 \end{array}\right\}$$
f has zeros at $x = -13/3, -2$, and $19/5$

D] f is increasing on $[-5,-4] \cup [3,5]$ because the slope of f is positive on $(-5,-4) \cup (3,5)$.



AB. Q100. LESSON 2 GRAPH GREEN 5

A] D: $\{x \mid -\infty < x < -8 \text{ or } -8 < x < 4 \text{ or } 4 < x < \infty\}$

alternate 1

D: $x \in (-\infty, -8) \cup (-8, 4) \cup (4, \infty)$

alternate 2

D: $\{x \mid x \neq -8, 4\}$

8 is an estimation

B] f is increasing on $(-8, -2.5] \cup [8, \infty)$

* NOTE THE MIXING OF BRACKET AND PARENTHESES
THERE MUST BE A PARENTHESIS AROUND BOTH
$x = -8$ and ∞ AS THESE ARE <u>NOT</u> IN THE DOMAIN
• BRACKET OR PARENTHESES ABOUT $x = -2.5$ and 8
STANDARD VS CONCEPT DEFINITION

C] f is concave up on $(-5, -3.5) \cup (4, 9)$ ESTIMATIONS MADE

b/c slope slope of f is increasing on this interval

D] f has a local min at $x = 8$ because f is continuous and the slope of f goes from negative to positive at $x = 8$.

E] $$f'(-1) \approx \frac{f(0) - f(-2.5)}{0 - (-2.5)} = \frac{-2 - (-0.55)}{0 + 2.5} = \frac{-1.45}{2.5} = -0.58$$

Average on small neighborhood ... $f(0) = -2$ and $f(-2.5) = -0.55$ (Given)

F] HORIZONTAL ASYMP: $y = \cancel{1}\,3$ $\lim_{x\to\infty} f(x) = \cancel{1}\,3$ and $\lim_{x\to-\infty} f(x) = \cancel{1}\,3$

VERTICAL ASYMP: $x = 4$ $\lim_{x\to4^+} f(x) = \infty$ and $\lim_{x\to4^-} f(x) = -\infty$

Vertical Asymp: $x = -8$ $\lim_{x\to-8^+} f(x) = -\infty$ and $\lim_{x\to-8^-} f(x) = -\infty$

* CAN SUMMARIZE AS $\lim_{x\to-8} f(x) = -\infty$

NOTE: NONE OF THESE LIMITS ACTUALLY EXIST!