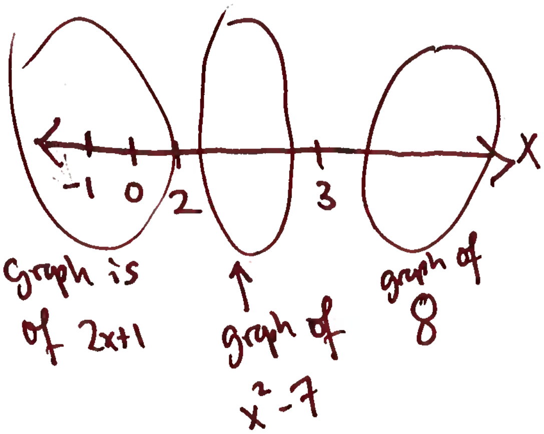
increasing/decreasing/constant – MON

Now: continue w/ piecewise

Ex: Consider

$$f(x) = \begin{cases} 2x+1 & ; \ x<2 \\ x^2-7 & ; \ 2 \le x \le 3 \\ 8 & ; \ x>3 \end{cases}$$



Calculate

$f(-1) = 2(-1)+1 = -1 \Rightarrow (-1,-1)$ on graph

$f(0) = 2(0)+1 = 0+1 = 1 \Rightarrow (0,1)$ " "

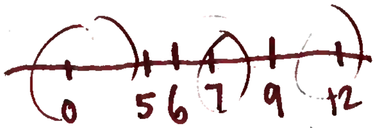
$0<2$ ✓

$f(2) = 2^2-7 = 4-7 = -3 \Rightarrow (2,-3)$

$f(3) = 3^2-7 = 9-7 = 2 \Rightarrow (3,2)$

$f(4) = 8 \Rightarrow (4,8)$

Ex: $f(x) = \begin{cases} 3x+5 \; ; & x \leq 6 \\ x^2+2x+1 \; ; & 6 < x \leq 9 \\ x^3+x^2 \; ; & x > 9 \end{cases}$



Compute:

$f(0) = 3(0)+5 = 5$

$f(5) = 3(5)+5 = 15+5 = 20$

$f(6) = 3(6)+5 = 18+5 = 23$

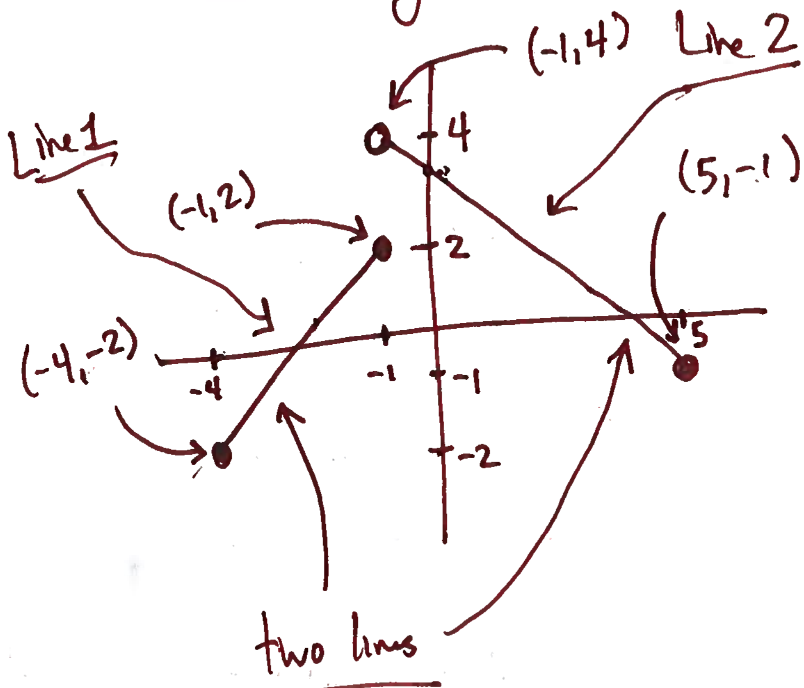
$f(7) = 7^2+2(7)+1 = 49+14+1 = 64$

$f(9) = 9^2+2(9)+1 = 81+18+1 = 100$

$f(12) = 12^3+12^2 = 1728+144$

$= 1872$

Ex: Find formula for the piecewise fnct in the following graph:



$$\frac{5}{-6} = -\frac{5}{6} = \frac{-5}{6}$$

We know how to find eqt of a line!

$$\boxed{y - y_0 = m(x - x_0)}$$

m = slope

(x_0, y_0) on line

$\downarrow$ we went

$$\boxed{y = y_0 + m(x - x_0)}$$

$4 = \frac{24}{6}$

Line 1

$$m = \text{slope} = \frac{2-(-2)}{-1-(-4)} = \frac{2+2}{-1+4} = \frac{4}{3}$$

Use $(x_0, y_0) = (-1, 2) \Rightarrow$

$$y = 2 + \frac{4}{3}(x-(-1))$$

$2 = \frac{6}{3}$

$$= \frac{4}{3}x + \frac{4}{3} + 2 = \frac{4}{3}x + \frac{10}{3}$$

Line 2

$$m = \text{slope} = \frac{4-(-1)}{-1-5} = \frac{5}{-6}$$

Use $(x_0, y_0) = (-1, 4) \Rightarrow$

$$y = 4 + \left(-\frac{5}{6}\right)(x-(-1))$$

$$= -\frac{5}{6}x - \frac{5}{6} + 4$$

$$= -\frac{5}{6}x + \frac{19}{6}$$

Piecewise fnct:

Line1

$$f(x) = \begin{cases} \frac{4}{3}x + \frac{10}{3} \; ; & -4 \le x \le -1 \\ -\frac{5}{6}x + \frac{19}{6} \; ; & -1 < x \le 5 \end{cases}$$

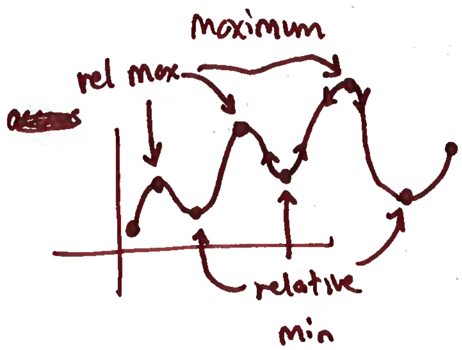
OR x in $[-4,-1]$

$x \in [-4,-1]$

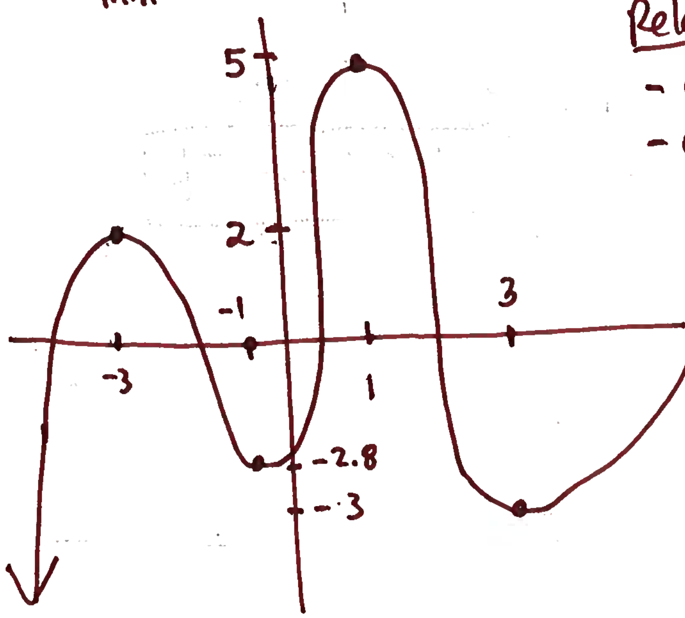
Line 2

Relative max and relative min

minimum



Ex:



Relative maxes:

- at $x=-3$ w/ value 2
- at $x=1$ w/ value 5

Relative min:

at $x=-1$ w/ value -2.8

at $x=3$ w/ value -3