20) $f(x) = \frac{1}{x}$

$h(x) = f(x-1) + 1 =$

$h(x) = \frac{1}{x-1} + 1 \qquad x \neq 1$

$D: R - \{1\}$

21) $f(x) = x^3 + 2x$ odd

$f(-x) = (-x^3) - 2x = -x^3 - 2x$

$f(x) \neq f(-x)$

$-f(-x) = +x^3 + 2x = f(x) \rightarrow$ odd

22) $f(s) = s^4 + 3s^2 + 7$

$f(-s) = s^4 + 3s^2 + 7 \rightarrow f(s) = f(-s)$ - even

23) $y - y_1 = m(x - x_1)$

$(5,1) \quad (8,7)$

$7 - 1 = m \cdot (8 - 5)$

$6 = 3m$

$m = 2$

$7 = 2 \cdot 8 + b$

$-9 = b$

$(y = mx + b)$

$\boxed{y = 2x - 9}$

$1 = 2 \cdot 5 + b$

$b = -9$

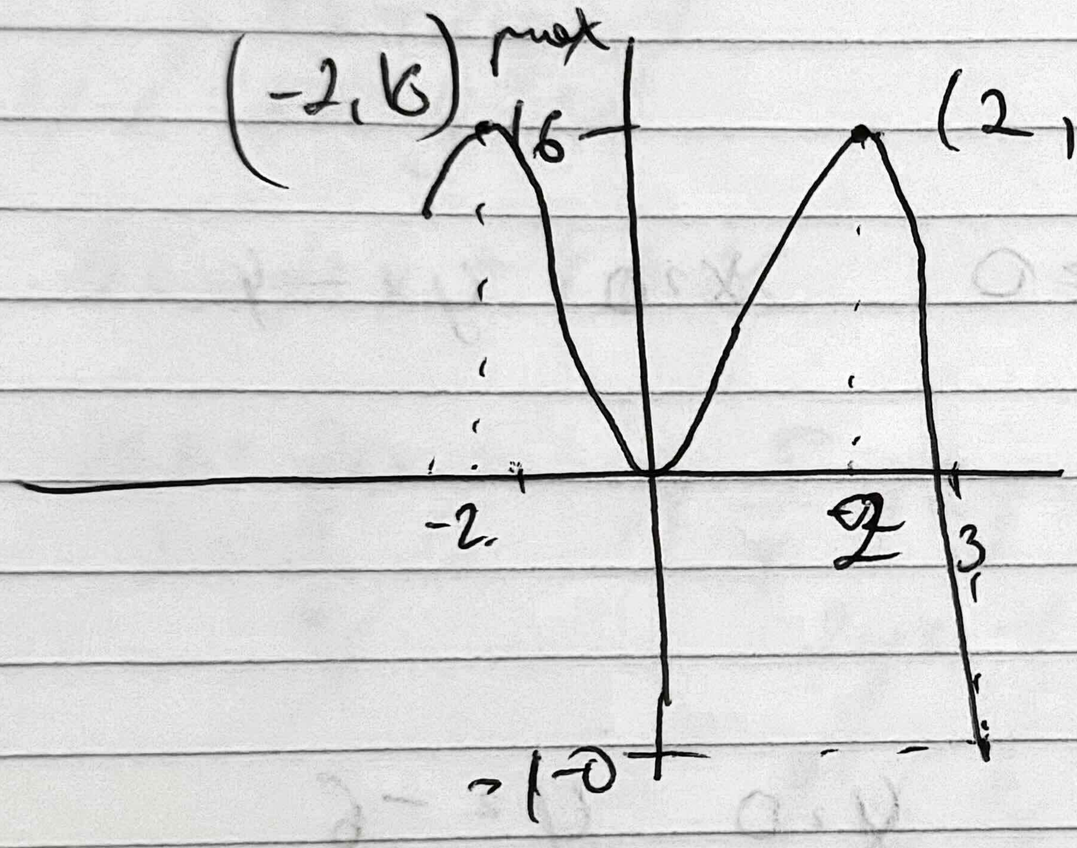
24) $(3,-2)$ $(8,1)$

$$m = \frac{1+2}{8-3} = \frac{3}{5} \rightarrow \text{increasing}$$

if $m > 0$ → increasing

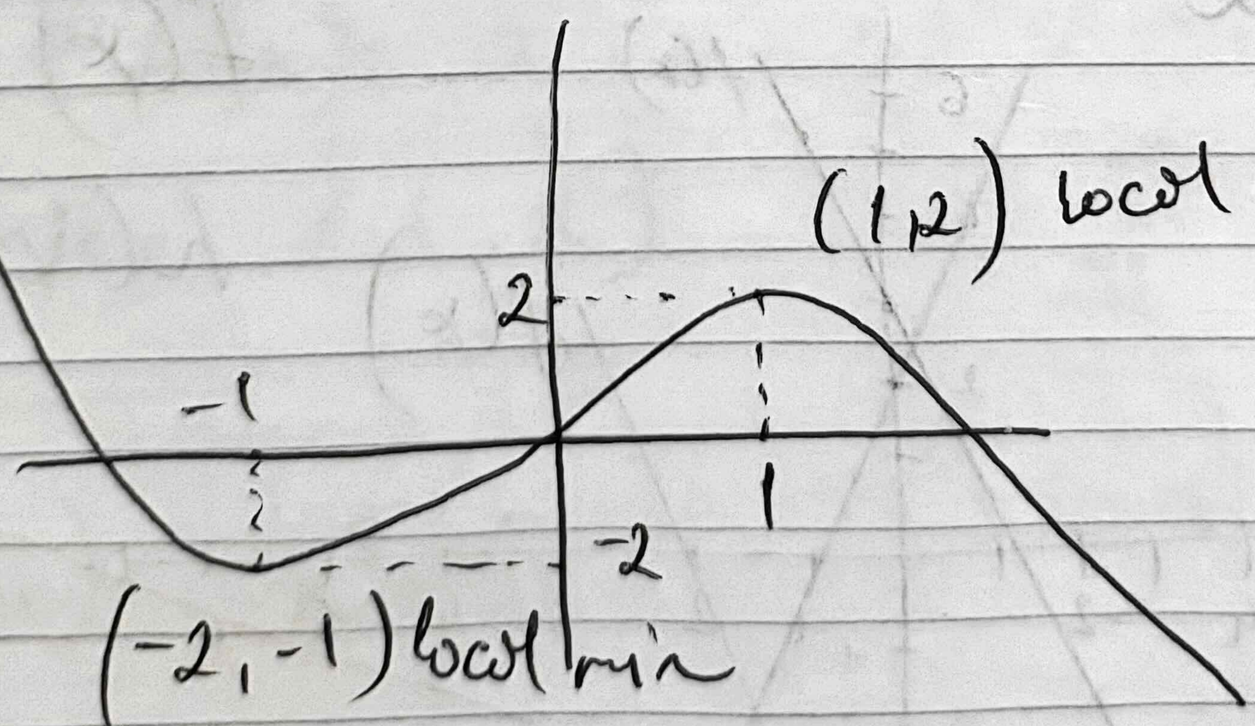
25) ab. max. $x=c$ $f(c) \geq f(x)$

ab min of f at $x=d$ is $f(d)$, $f(d) \leq f(x)$ for all x in domain of f



(3,-10) → absolute min

26)



27) $f(x) = 2x+3$ if $x=0$ $y=3$
$x=1$ $y=5$.

$2x+3=0$
$2x=-3$
$x=\frac{-3}{2}$ → ~~Prove Intersection but not perpendicular nor parallel~~

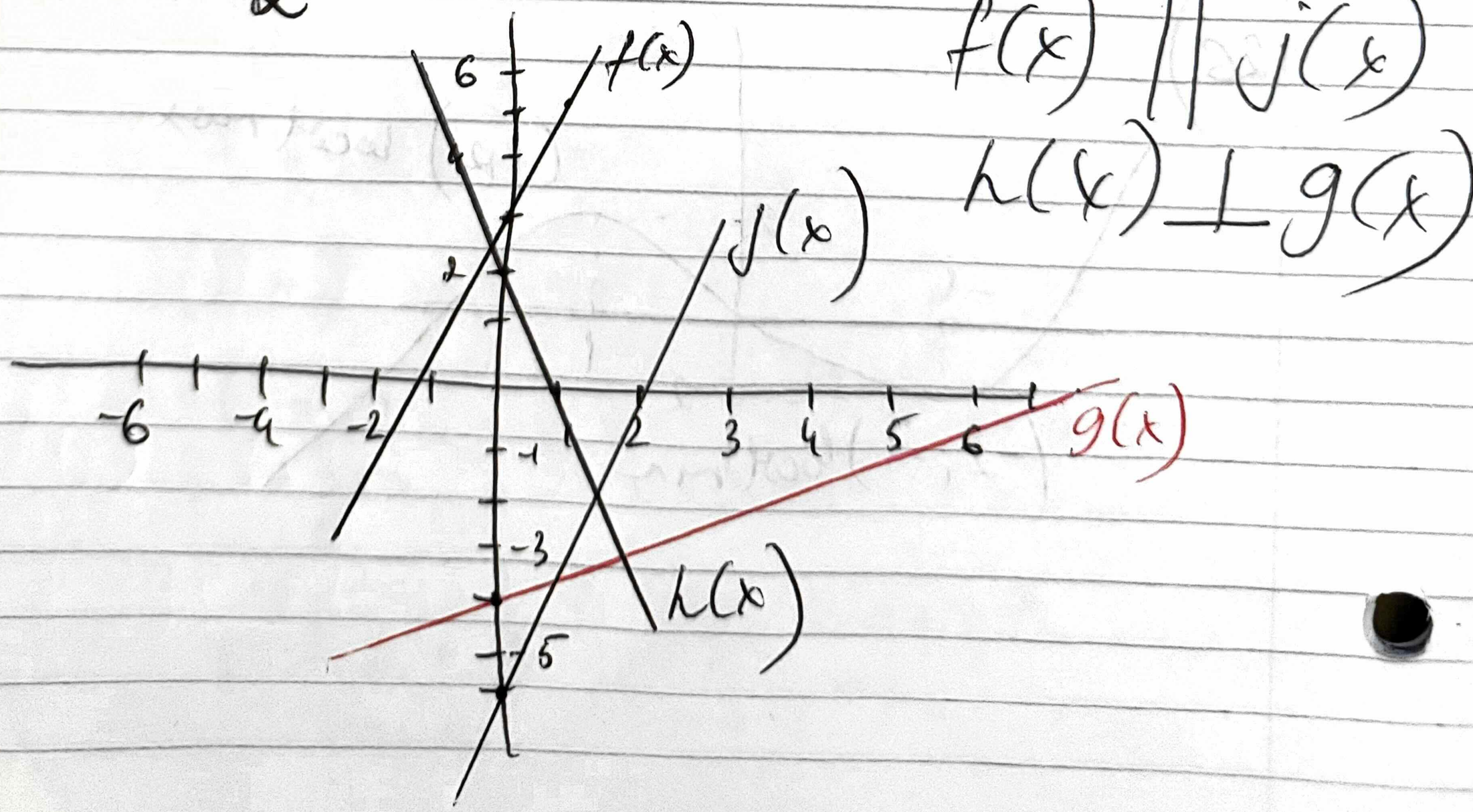
$h(x) = -2x+2 = 0$ $x=0$ $y=2$
$2x=2$
$x=1$

$g(x) = \frac{1}{2}x - 4 = 0$ $x=0$ $y=-4$

$\frac{x}{2} = 4$
$x=8$

$j(x) = 2x-6=0$ $x=0$ $y=-6$.
$x=3$

$f(x) \parallel j(x)$
$h(x) \perp g(x)$



28) $\begin{cases} 2x+y=7 \\ x-2y=6 \end{cases}$

$5x = 14+6$

$x=4$ $\qquad y=7-8=-1$

$x=4, \quad y=-1$

29) $\begin{cases} 4x+2y=4 \\ 6x-y=8 \end{cases}$

$4x+12x = 4+16$

$16x=20$

$x=\frac{5}{4}$

$4\cdot\frac{5}{4}+2y=4$

$2y=-1$

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

$(x+h)^2 \quad x^2-2hx+h^2$

30) st form $f(x)=a(x-h)^2+k$

vertex (h,k) $\qquad h=\frac{-b}{2a}$ $\qquad k=f(h)=f\left(\frac{-b}{2a}\right)$

$f(x)=ax^2+bx+c$

$a=1 \qquad b=-2h$

$c=h^2+k.$

vertex $\qquad h=\frac{2h}{2a} \qquad k=$

$ha=2h$

$a=1$

30) $f(x) = 2x^2 - 6x + 7$

$a = 2 \quad b = -6 \quad c = 7$

$f(x) = a(x-h)^2 + k$

$h = \frac{-b}{2a} = \frac{6}{4} = \frac{3}{2}$

$K = f(h) = f\left(\frac{3}{2}\right) = 2\cdot\left(\frac{9}{4}\right) - 6\cdot\frac{3}{2} + 7$

$= \frac{9}{2} - \frac{18}{2} + 7$

$= \frac{14-9}{2} = \frac{5}{2}$

$$\boxed{f(x) = 2\cdot\left(x-\frac{3}{2}\right)^2 + \frac{5}{2}}$$

31) $f(x) = -5x^2 + 9x - 1 \qquad D: R$

$a = -5$, $f(x)$ has max.

$h = \frac{-9}{2\cdot(-5)} = \frac{9}{10}$

$f(h) = -5\cdot\left(\frac{81}{100}\right) + \frac{9\cdot 9}{10} - 1 = \frac{-81 + 81\cdot 2 - 20}{20}$

$= \frac{61}{20} \rightarrow$ max.

$R: \left(-\infty, \frac{61}{20}\right]$

32) $f(x) = 3x^2 + 5x - 2$

$x = 0 \quad y = -2$ (y intercept)

$3x^2 + 5x - 2 = 0$

$x \quad 2 \quad (x+2)(3x-1) = 0$

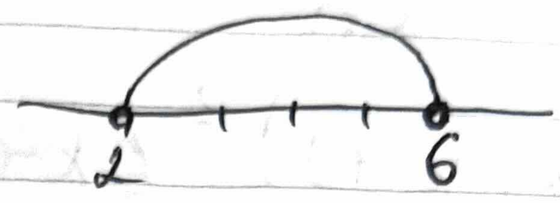
$3x \quad -1$

$x = -2 \qquad x = \frac{1}{5}$ (x intercept)

33) a) $-1 \leq 2x-5 < 7$

$4 \leq 2x \leq 12$

$2 \leq x \leq 6$

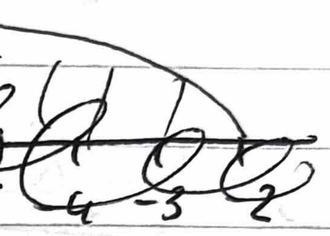


$x \in [2,6]$

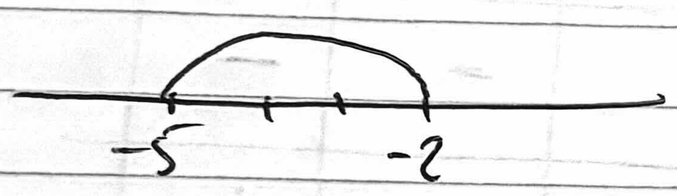
b) $x^2 + 7x + 10 < 0$

$(x+5)(x+2) < 0$

$x < -5 \quad x < -2$



$x \in (-\infty, -5)$

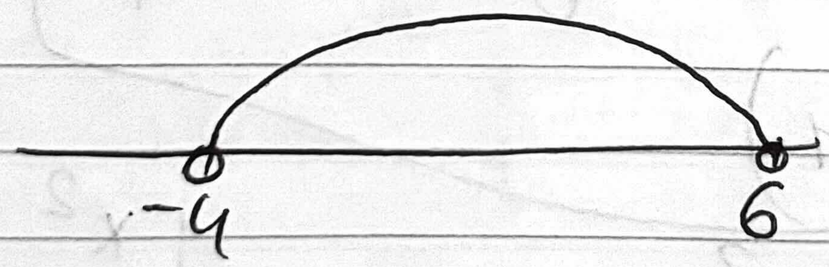


$-5 < x < -2$

$x \in (-5,-2)$

c) $-6 < x-2 < 4$

$-4 < x < 6$



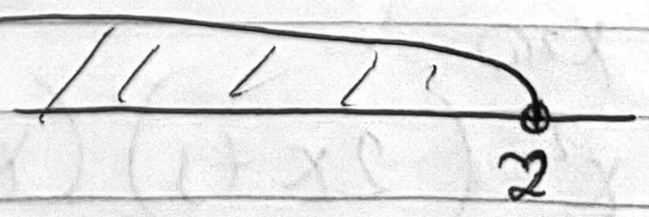
$x \in (-4,6)$

34) $10-(2y+1) \leq -4(3y+2)-3$

$10-2y-1 \leq -12y-8-3$ setbuilder $\{y / y \leq 2\}$

$10y \leq -20$ Interval: $(-\infty, -2]$

$y \leq -2$



35) $x(x+3)^2(x-4) \leq 0$

~~≤ 0~~

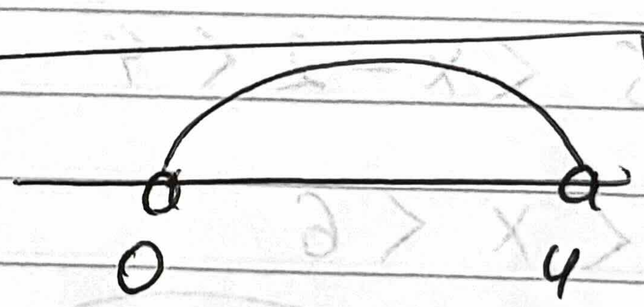
$x(x+3)^2(x-4) \geq 0$

$x \geq 0 \quad (x+3)^2 \geq 0 \quad x \geq -4$

$x^2 \quad x^2 - 3$

	x	$(x+3)^2$	$(x-4)$	product
$x < -3$	$-$	$+$	$-$	$+$
$-3 < x < 0$	$-$	$+$	$-$	$+$
$0 < x < 4$	$+$	$+$	$-$	$-$
$x > 4$	$+$	$+$	$+$	$+$

$0 \leq x \leq 4$



$x \in (0, 4)$

36) $2x^4 > 3x^3 + 9x^2$

$2x^4 - 3x^3 - 9x^2 > 0$

$x^2(2x^2 - 3x - 9) > 0$

$2x \quad -3$

$x \quad 3$

$x^2(2x+3)(x-3) > 0$

$x \geq 0 \quad x \geq \frac{-3}{2} \quad x > 3$

	x^2	$2x+3$	$x-3$	prod.
$x < -\frac{3}{2}$	$+$	$-$	$-$	$+$
$-\frac{3}{2} < x < 0$	$+$	$+$	$-$	$-$
$0 < x < 3$	$+$	$+$	$-$	$-$
$x > 3$	$+$	$+$	$+$	$+$

$x \in (-\infty, \frac{-3}{2}) \cup (3, +\infty)$

37) $f(x) = \frac{-1}{2}|4x-5| + 3$

$f(x) < 0 \rightarrow x?$

$-\frac{1}{2}|4x-5| + 3 < 0$

$-\frac{1}{2}|4x-5| < -3$

$|4x-5| < 6$

$4x-5 = 6$

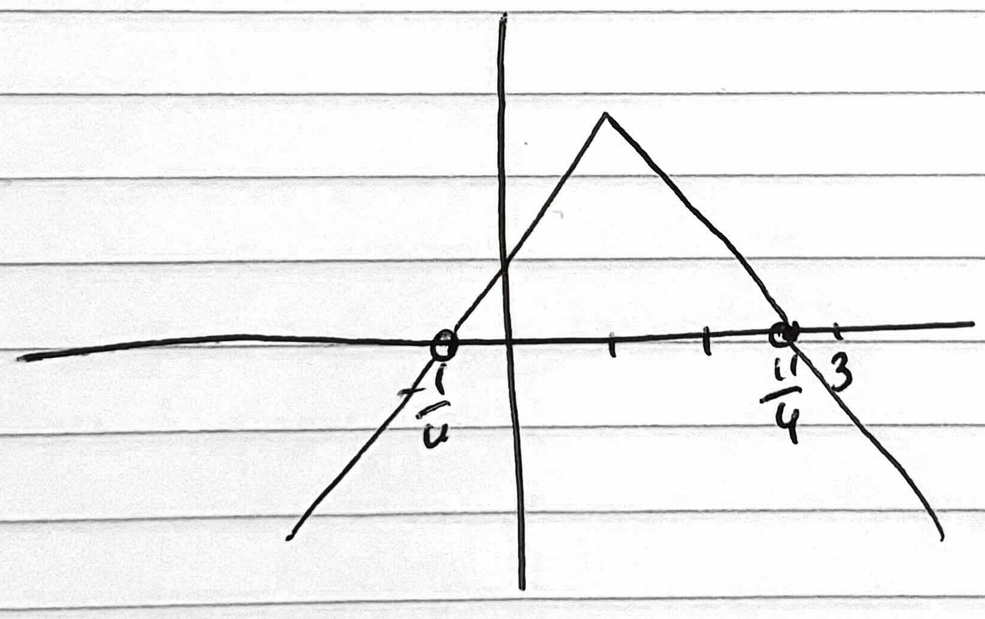
$4x = 11$

$x = \frac{11}{4}$

$4x-5 = -6$

$4x = -1$

$x = -\frac{1}{4}$



$f(x)$ is negative when $x = -\frac{1}{4}$

$x \in (-\infty, -\frac{1}{4}) \cup (\frac{11}{4}, \infty)$

38) $13 - 2|4x-7| \leq 3$

$-2|4x-7| \leq -10$

$|4x-7| \leq 5$

$4x-7 = 5$

$4x = 12$

$x = 3$

$4x-7 = -5$

$4x = 2$

$x = \frac{1}{2}$

$x \in (-\infty, \frac{1}{2}] \cup [3, \infty)$