This is a non-strict inequality!

Example: Solve the inequality using cases and intervals.

b) $-2x^3 - 6x^2 + 12x + 16 \leq 0$

This inequality is in $P(x) \leq 0$ form. Good!

We also can simplify it a bit.

All the coefficients are even integers.

So we can divide through (both sides, each term on each side) by (-2).

(Don't forget to reverse the sign of the inequality!)

$$x^3 + 3x^2 - 6x - 8 \geq 0$$

let $P(x) = x^3 + 3x^2 - 6x - 8$

divisors of -8: $\pm 1, \pm 2, \pm 4, \pm 8$

$P(-1) = 0 \xRightarrow{\text{therefore}} (x+1)$ is a factor of $P(x)$

$$\begin{array}{r|l} & x^2 + 2x - 8 \\ \hline x+1 & x^3 + 3x^2 - 6x - 8 \\ & x^3 + x^2 \\ \hline & \quad 2x^2 - 6x \\ & \quad 2x^2 + 2x \\ \hline & \qquad -8x - 8 \\ & \qquad -8x - 8 \\ \hline & \qquad\quad 0 \end{array}$$

$P(x) = (x+1)(x^2 + 2x - 8)$

$P(x) = (x+1)(x+4)(x-2)$

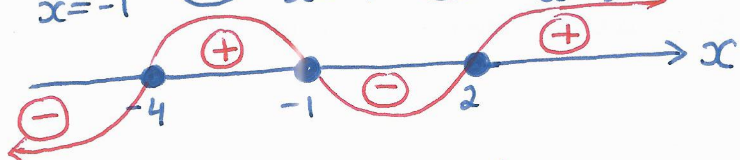
Set $P(x) = 0$, find the x-intercepts.

$0 = (x+1)(x+4)(x-2)$

$x+1=0$ OR $x+4=0$ OR $x-2=0$

$x=-1$ $\quad x=-4$ $\quad x=2$

We test $P(x) = (x+1)(x+4)(x-2)$ on each of four intervals.



We seek solution(s) for $P(x) \geq 0$ which is equivalent to the original inequality.

including end points of the interval

$\underbrace{-4 \leq x \leq -1 \text{ or } x \geq 2}_{\text{Inequality solution}}$ OR $[-4, -1] \cup [2, +\infty)$