

B.4 Solving Inequalities Algebraically and Graphically

Ex. ① Suppose that Sam is a teenager whose age is x .

Write a compound inequality for x .

Solution: $13 \leq x < 20$ ← Inequality notation

$[13, 20)$ ← Interval notation
Include — Exclude



Ex. ② Solve: $-11 \leq 5 - 3x < 13$ algebraically

$\times (-\frac{1}{3})$

$$-16 \leq -3x < 8$$

$$\frac{16}{3} \geq x > -\frac{8}{3}$$

$$-\frac{8}{3} < x \leq \frac{16}{3}$$

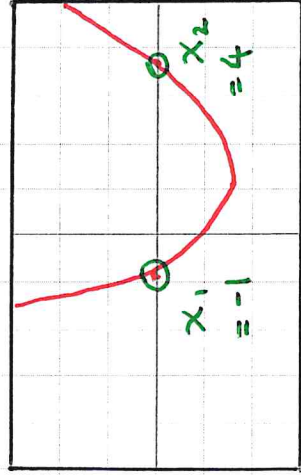
Interval Notation: $(-\frac{8}{3}, \frac{16}{3}]$

* Neg. multiplier → Switch directions

Ex. ③ Solve: $x^2 - 3x \geq 4$ graphically

Zero Form: $x^2 - 3x - 4 \geq 0$

Graph $Y1 = x^2 - 3x - 4$



above the x-axis, $Y1 > 0$

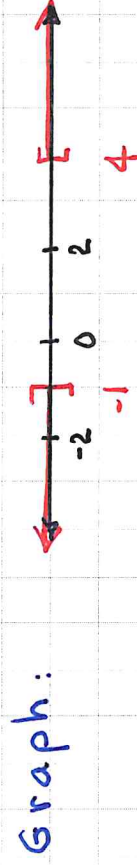
on the x-axis, $Y1 = 0$

below the x-axis, $Y1 < 0$

Window: $[-5, 5] \times [-10, 10]$

Solution $(-\infty, -1]$ or $[4, \infty)$

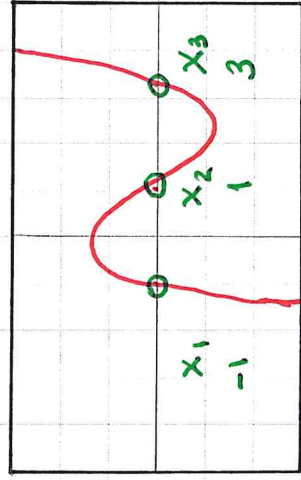
Interval Notation:



Ex. ④ Solve: $x^3 - 3x^2 > x - 3$ graphically

Zero Form: $x^3 - 3x^2 - x + 3 > 0$

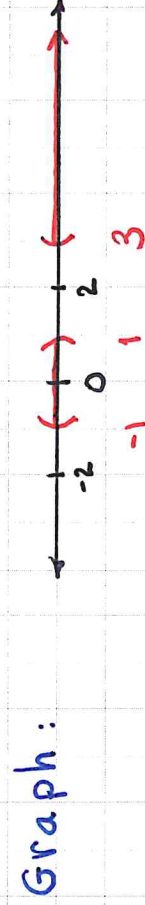
Graph $y_1 = x^3 - 3x^2 - x + 3$



Window: $[-5, 5] \times [-5, 5]$

Solution: $(-1, 1) \cup (3, \infty)$

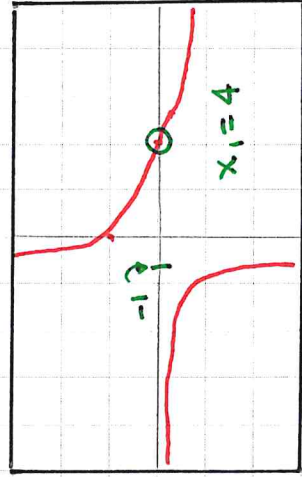
Interval Notation:



Ex. ⑤ Solve: $\frac{x+6}{x+1} \geq 2$ graphically

Zero Form: $\frac{x+6}{x+1} - 2 \leq 0$

Graph $Y1 = (x+6)/(x+1) - 2$



Standard Window

Solution: $(-1, 4]$

Interval Notation:

