

1.4 Solving Inequalities

The ability to **solve inequalities** will be required later in the course when we do detailed study of the graphs of functions.

$$x \leq -4 \quad (-\infty; 4]$$

Linear Inequalities in One Variable



$$\begin{aligned} -3x + 4 &\geq 16 \\ -3x &\geq 12 \end{aligned}$$

Linear Inequalities in One Variable

Ex.1 Solve the following and write your solution in interval notation.

$$\cdot 10 \quad 5 - \frac{3}{5}(2x-1) \geq \frac{1}{2}x - 8$$

$$50 - 6(2x -$$

Solving Double Linear Inequalities In One Variable

Ex.2 Solve the following and write your solution in interval notation.

$$-9 < 5 - \frac{7}{4}x < 26$$

Ex.3 Solve the following and write your solution in interval notation.

$$\frac{1}{6} \leq \frac{2}{x+1} \leq \frac{1}{2}$$



**Remember
restrictions!**

Ex.4 Solve the following and write your solution in interval notation.

$$-2 \leq \frac{3}{1-2x} \leq -\frac{1}{3}$$



Remember restrictions!

$$\begin{aligned} 1-2x &\neq 0 \\ 1 &\neq 2x \\ \frac{1}{2} &\neq x \end{aligned}$$

$$-\frac{1}{2} \geq \frac{1-2x}{3} \geq -3$$

$$-3 \geq 2(1-2x) \geq -18$$

$$-3 \geq 2-4x \geq -18$$

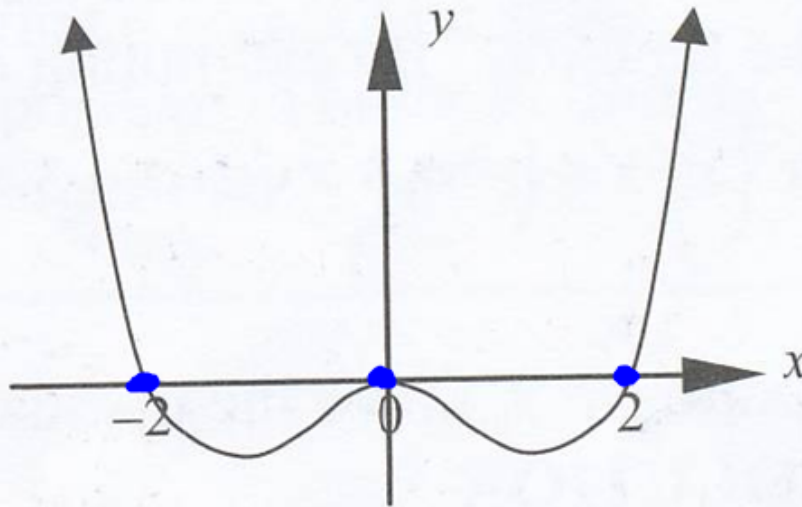
$$-5 \geq -4x \geq -20$$

$$-\frac{5}{4} \leq x \leq 5$$

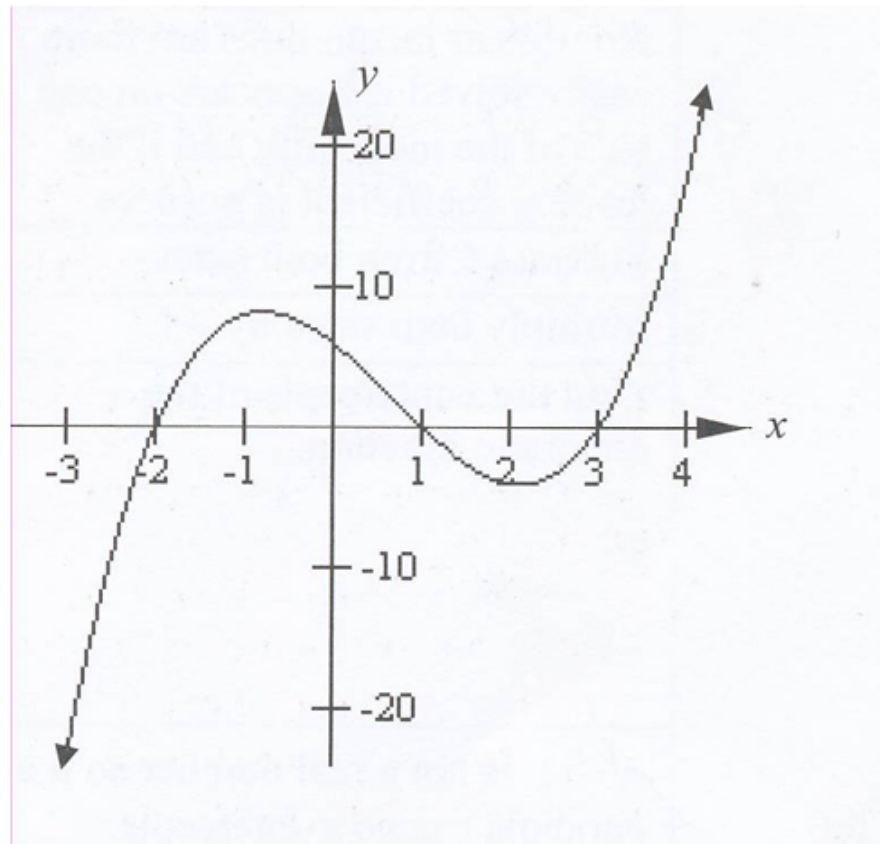
$$\left[\frac{5}{4}, 5 \right]$$

Graphical Solutions of Inequalities

Examine the sketch of the function $y = f(x)$ below and determine the values of x for which $f(x) > 0$.



Example 5. Examine the graph of $y = x^3 - 2x^2 - 5x + 6$ shown at right and determine the values of x for which (a) $x^3 - 2x^2 - 5x + 6 > 0$, (b) $x^3 - 2x^2 - 5x + 6 < 0$, and (c) $x^3 - 2x^2 - 5x + 6 = 0$.



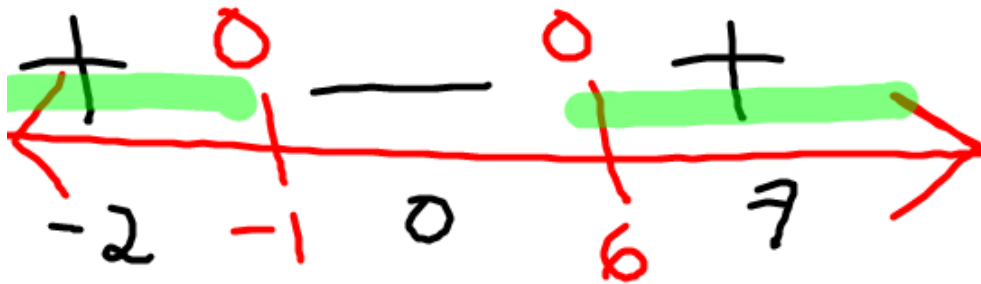
Ex.6 Solve each inequality, write your answer in interval notation.

$$\text{a) } x^2 \geq 5x + 6$$

$$(-\infty, -1] \cup [6, \infty)$$

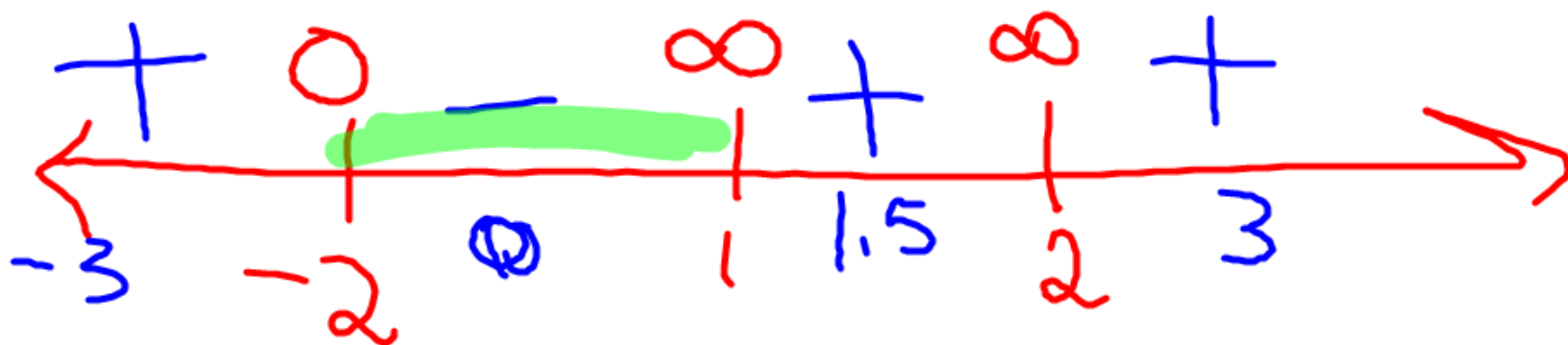
$$x^2 - 5x - 6 \geq 0$$

$$(x-6)(x+1) \geq 0$$



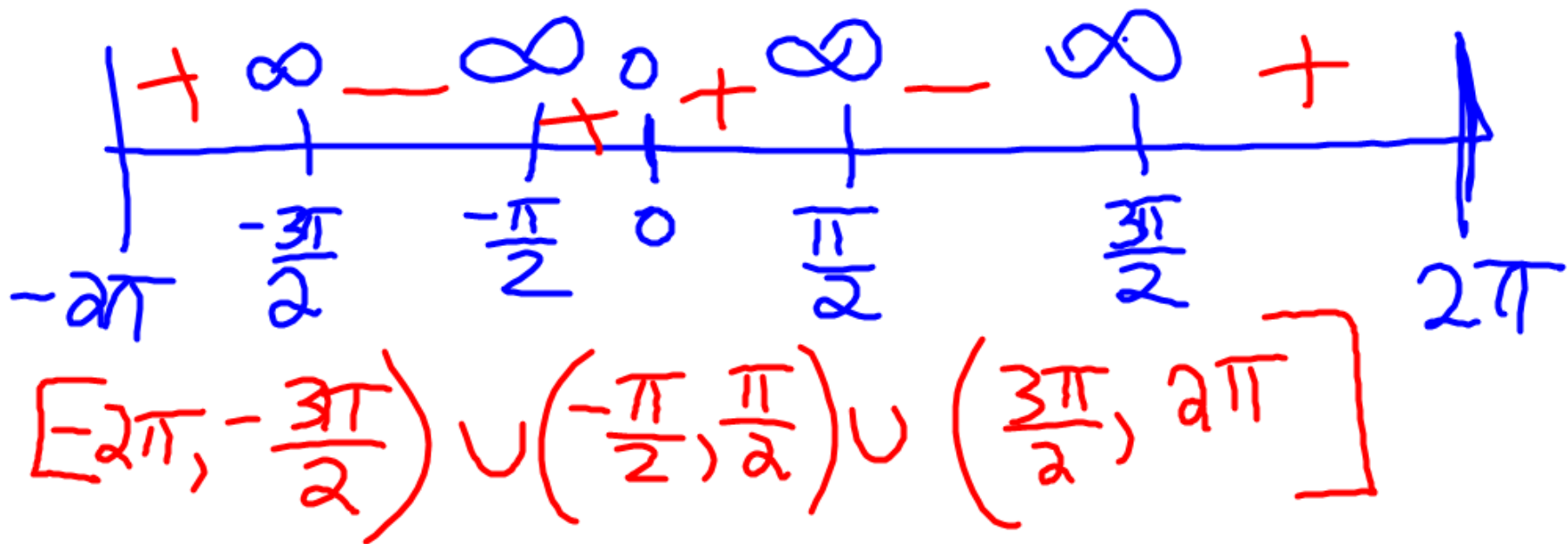
$$\text{b) } \frac{x^2 - 4}{x^2 - 3x + 2} < 0$$

$$\frac{(\cancel{x-2})(x+2)}{(\cancel{x-2})(x-1)} < 0$$



$$[-2, 1)$$

$$c) \frac{x^2}{\cos x} \geq 0 \text{ for } x \in [-2\pi, 2\pi]$$



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1,3,5,6,7,8,11,12,14,15,16,17,18
,19,21