

Due date: _____

Name: _____

Getting Ready for Derivatives (Part 3)

Notesex: Solve $x^3 - x^2 - 9x + 9 > 0$.

$$x^2(x-1) - 9(x-1) > 0$$

$$(x-1)(x^2-9) > 0$$

$$(x-1)(x+3)(x-3) > 0$$



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

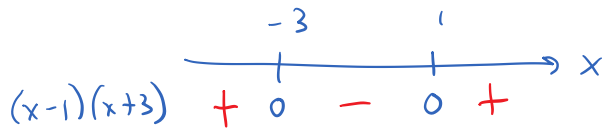
$$\underline{1}: (-)(-)(-) \quad \underline{2}: (-)(+)(-) \quad \underline{3}: (+)(+)(-) \quad \underline{4}: (+)(+)(+)$$

$$\text{Solution: } \boxed{(-3, 1) \cup (3, \infty)}$$

1. Solve the following inequalities.

a) $x^2 + 2x - 3 < 0$

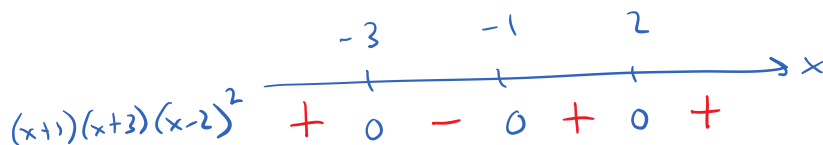
$$(x-1)(x+3) < 0$$



$$\text{Solution: } \boxed{(-3, 1)}$$

b) $(x+1)(x+3)(x-2)^2 \geq 0$

$$\begin{array}{ccc} \uparrow & \uparrow & \uparrow \\ -1 & -3 & 2 \end{array}$$



$$\text{Solution: } \boxed{(-\infty, -3] \cup [-1, \infty)}$$

Notes

Recall the following formulas:

Volume of a sphere with radius r : $\frac{4}{3}\pi r^3$

Note: $\frac{d}{dr} \left(\frac{4}{3}\pi r^3 \right) = 4\pi r^2$

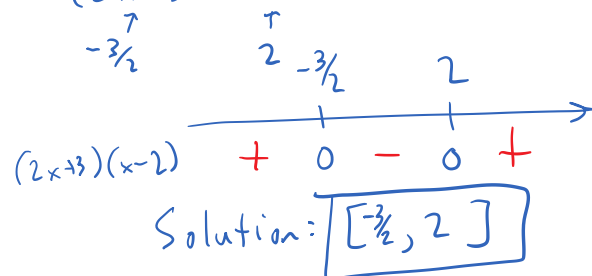
Surface area of a sphere with radius r : $4\pi r^2$

Practice at home

2. Solve the following inequalities.

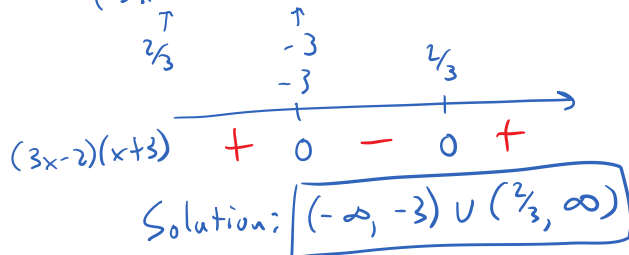
a) $2x^2 - x - 6 \leq 0$

$$(2x+3)(x-2) \leq 0$$



b) $3x^2 + 7x - 6 > 0$

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

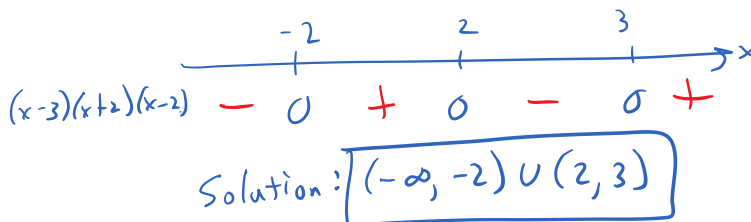


c) $x^3 - 3x^2 - 4x + 12 < 0$

$$x^2(x-3) - 4(x-3) < 0$$

$$(x-3)(x^2-4) < 0$$

$$(x-3)(x+2)(x-2) < 0$$



d) $(x-1)^2(2x-3)(x+2)^3 \geq 0$

