

1. (8pts) Solve the inequalities. Draw your solution and write it in interval form.

$$3 \leq 5 + 4x < 7 \quad | -5$$

$$-2 \leq 4x < 2 \quad | \div 4$$

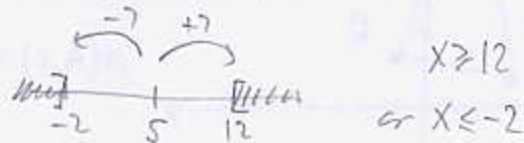
$$-\frac{1}{2} \leq x < \frac{1}{2}$$



$$\left[-\frac{1}{2}, \frac{1}{2}\right)$$

$$|x - 5| \geq 7$$

distance from  $x$  to  $5 \geq 7$



$$x \geq 12$$

$$\text{or } x \leq -2$$

$$x \text{ in } (-\infty, -2] \cup [12, \infty)$$

2. (6pts) Find all the solutions of the equation.

$$|x^2 + x| = 12$$

$$x^2 + x = 12 \quad \text{or} \quad x^2 + x = -12$$

$$x^2 + x - 12 = 0$$

$$x^2 + x + 12 = 0$$

$$(x+4)(x-3) = 0$$

$$x = \frac{-1 \pm \sqrt{1^2 - 4 \cdot 1 \cdot 12}}{2 \cdot 1} = \frac{-1 \pm \sqrt{-47}}{2} = \frac{-1 \pm i\sqrt{47}}{2}$$

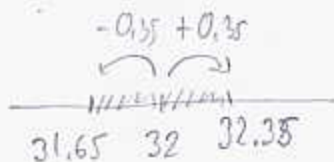
$$x = -4, 3 \quad \text{or}$$

$$\text{Solutions: } x = -4, 3, \frac{-1 \pm i\sqrt{47}}{2}$$

3. (4pts) The weight of packages of sugar coming from a factory is  $32(\pm 0.35)$  ounces. Write an absolute value inequality about weight  $w$  that expresses this fact and solve this inequality.

$$|w - 32| \leq 0.35$$

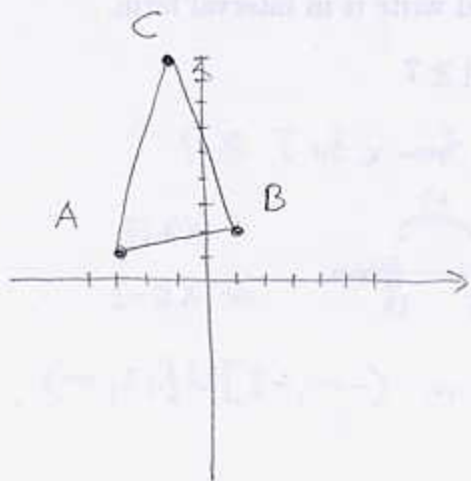
distance from  $w$  to  $32 \leq 0.35$



$$31.65 \leq x \leq 32.35$$

$$\left[31.65, 32.35\right]$$

4. (6pts) Let  $A = (-3, 1)$ ,  $B = (1, 2)$ ,  $C = (-1, 9)$ . Sketch the triangle  $ABC$  in the coordinate system and determine (algebraically) whether it is a right triangle.



$$d(A, B) = \sqrt{(1 - (-3))^2 + (2 - 1)^2} = \sqrt{16 + 1} = \sqrt{17}$$

$$d(B, C) = \sqrt{(-1 - 1)^2 + (9 - 2)^2} = \sqrt{4 + 49} = \sqrt{53}$$

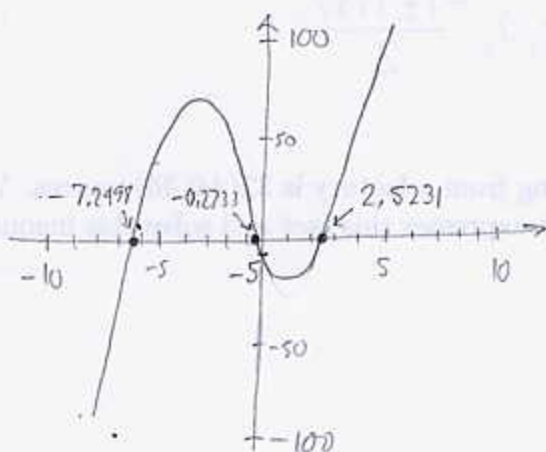
$$d(A, C) = \sqrt{(-1 - (-3))^2 + (9 - 1)^2} = \sqrt{4 + 64} = \sqrt{68} \leftarrow \begin{array}{l} \text{biggest,} \\ \text{so potential} \\ \text{hypotenuse} \end{array}$$

$$\text{Is } \sqrt{17}^2 + \sqrt{53}^2 \stackrel{?}{=} \sqrt{68}^2$$

$$17 + 53 = 70, \text{ not } 68$$

so triangle is not a right triangle.

5. (6pts) Use your graphing calculator to accurately draw the graph (on paper!) of  $y = x^3 + 5x^2 - 17x - 5$ . Determine the  $x$ - and  $y$ -intercepts (with 4-decimal-point accuracy) and indicate the scale on the graph.



$$\begin{array}{l} y\text{-int: } x=0 \\ y=-5 \end{array}$$

$$\begin{array}{l} x\text{-int: } y=0 \\ x_1 = -7.2498 \\ x_2 = -0.2733 \\ x_3 = 2.5231 \end{array}$$