

Quiz #5

Q1: $|w - 148| < 2$, w : wrestler weight.

Q2: (a) $3|x+1| - 2 = -11 \Rightarrow 3|x+1| = -9 \Rightarrow |x+1| = -3$
 $S = \emptyset$

(b) $\frac{3x-1}{3} - \frac{2x}{x-1} = x \Rightarrow \frac{(3x-1)(x-1) - 6x}{3(x-1)} = x$

$$\frac{3x^2 - 10x + 1}{3(x-1)} = x \Rightarrow 3x^2 - 10x + 1 = 3x(x-1)$$

$$\Rightarrow 3x^2 - 10x + 1 = 3x^2 - 3x \Rightarrow -7x = -1 \Rightarrow x = \frac{1}{7}$$

$$S = \left\{ \frac{1}{7} \right\}$$

(c) $\sqrt[5]{2x^2+1} - 2 = 0 \Rightarrow \sqrt[5]{2x^2+1} = 2 \Rightarrow 2x^2+1 = 32$
 $2x^2 = 31 \Rightarrow x^2 = \frac{31}{2} \Rightarrow x = \pm \sqrt{\frac{31}{2}}$

$$S = \left\{ -\sqrt{\frac{31}{2}}, \sqrt{\frac{31}{2}} \right\}$$

(d) $3x^{2/3} + 4x^{1/3} - 4 = 0 \Rightarrow (3x^{1/3} - 2)(x^{1/3} + 2) = 0$

$$\Rightarrow 3x^{1/3} = 2 \text{ or } x^{1/3} = -2 \Rightarrow x = \frac{8}{27} \text{ or } x = -8$$

$$S = \left\{ -8, \frac{8}{27} \right\}$$

Q3 $c = \sqrt{4h(2R-h)} \Rightarrow c^2 = 4h(2R-h)$

$$\Rightarrow c^2 = 8Rh - 4h^2 \Rightarrow 4h^2 - 8Rh + c^2 = 0$$

$$\Delta = 64R^2 - 16c^2 = 16(4R^2 - c^2) > 0$$

$$h = \frac{8R \pm \sqrt{4R^2 - c^2}}{4} \Rightarrow h = R \pm \frac{1}{2} \sqrt{4R^2 - c^2}$$

Q4: (a) $x < |x-2| \leq 2$

(i) $x < |x-2|$

$x < |x-2|$

$\Rightarrow x - |x-2| < 0$

AND

(ii) $|x-2| \leq 2$

$-2 \leq x-2 \leq 2$

$0 \leq x \leq 4$

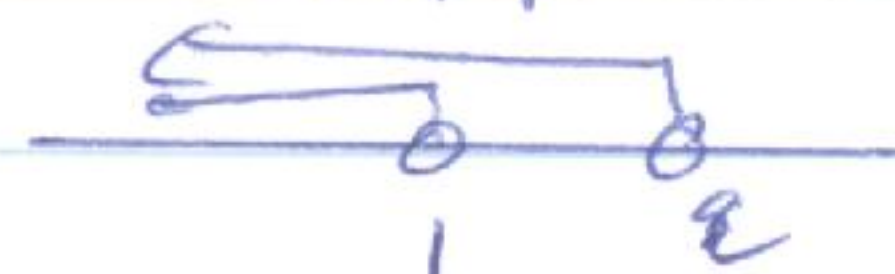
(ii')
 $S = [0, 4]$

x	2
$ x-2 $	$-x+2$ $x-2$
$x - x-2 < 0$	$x + x - 2 < 0$ $x - x + 2 < 0$

$D_1 = (-\infty, 2)$

$2x < 2$

$x < 1$



$S_1 = (-\infty, 1)$

$D_2 = (2, \infty)$

$2 < 0$ impossible

$S_2 = \emptyset$

(i)
 $S = S_1 \cup S_2 = (-\infty, 1)$

(i) (ii)
 $S = S \cap S = [0, 1)$

(b) $\frac{3}{|5-2x|} < 2 \Rightarrow |5-2x| > \frac{3}{2}$

$5-2x < -\frac{3}{2}$

$-2x < -\frac{13}{2}$

$x > \frac{13}{4}$

or

$5-2x > \frac{3}{2}$

$-2x > \frac{3}{2} - 5$

$-2x > -\frac{7}{2}$

$x < \frac{7}{4}$

$S = (-\infty, \frac{7}{4}) \cup (\frac{13}{4}, \infty)$

$$(c) \frac{1}{(x-2)^2} > 0 \quad (x-2)^2 \text{ is always positive, } x \neq 2$$

$$S = (-\infty, \infty) \setminus \{2\}$$

$$(d) \frac{(2x+1)^2(x-1)}{x(x^2-1)} \geq 0 \Rightarrow \frac{(2x+1)^2(x-1)}{x(x-1)(x+1)} \geq 0$$

$$\Rightarrow \frac{(2x+1)^2}{x(x+1)} \geq 0; \boxed{x \neq -1}$$

$$x = 0, x = -1, x = -1/2$$

	-1	-1/2	0	1	
x	-	-	0	+	+
$x+1$	-	0	+	+	+
$\frac{(2x+1)^2}{x(x+1)}$	+	-	0	+	+

$(2x+1)^2$ is always positive, therefore it has no influence on the final result.

$$S = (-\infty, -1) \cup (0, 1) \cup (1, \infty) \cup \{-\frac{1}{2}\}$$