2 以下の問いに答えよ．【★★】

(1) $x=\sqrt{3}-1$ のとき，$y=|x-1|+|x+1|$ の値を求めよ．

$|x-1| = |\sqrt{3}-2| = 2-\sqrt{3}.$

$|x+1| = |\sqrt{3}| = \sqrt{3}.$

$\therefore\ y = (2-\sqrt{3})+\sqrt{3}$

$= \underline{2}$

(2) $x=\dfrac{1}{\sqrt{2}-1}$ のとき，x^2-x+1 の値を求めよ．

$x = \dfrac{1}{\sqrt{2}-1} \times \dfrac{\sqrt{2}+1}{\sqrt{2}+1}$

$= \dfrac{\sqrt{2}+1}{2-1} = \sqrt{2}+1.$

$x^2 = (\sqrt{2}+1)^2 = 3+2\sqrt{2}.$ より

$x^2-x+1 = (3+2\sqrt{2})-(\sqrt{2}+1)+1$

$= 3+2\sqrt{2}-\sqrt{2}-1+1$

$= \underline{3+\sqrt{2}}$

(3) $x=\sqrt{2}+1$ のとき，$\dfrac{1}{x^3}+x^3$ の値を求めよ．

$\dfrac{1}{x^3}+x^3 = \left(\dfrac{1}{x}+x\right)^3 - 3\cdot\dfrac{1}{x}\cdot x\left(\dfrac{1}{x}+x\right)$

ここで，(2)より $\dfrac{1}{x} = \dfrac{1}{\sqrt{2}+1} = \sqrt{2}-1.$

$\dfrac{1}{x}+x = (\sqrt{2}-1)+(\sqrt{2}+1) = 2\sqrt{2}.$

$\therefore\ \dfrac{1}{x^3}+x^3 = (2\sqrt{2})^3 - 3\cdot(2\sqrt{2})$

$= 16\sqrt{2} - 6\sqrt{2} = \underline{10\sqrt{2}}$

(4) 不等式 $1 \leqq |x+1| \leqq 4$ を解け．

(i) $x+1 \geqq 0$ のとき

$1 \leqq x+1 \leqq 4$

$0 \leqq x \leqq 3.$

(ii) $x+1 < 0$ のとき

$1 \leqq -(x+1) \leqq 4$

$-1 \geqq x+1 \geqq -4$

$-4 \leqq x+1 \leqq -1$

$-5 \leqq x \leqq -2.$

(i), (ii)より

$\underline{-5 \leqq x \leqq -2,\ \ 0 \leqq x \leqq 3}$

(5) 連立不等式 $\begin{cases} \dfrac{1}{2}-\dfrac{1}{3}x \geqq \dfrac{5}{6}+\dfrac{1}{2}x & \text{— ①} \\ 1.4x-0.8 < 2.6-\left(\dfrac{1}{5}-0.6x\right) & \text{— ②} \end{cases}$

①より．

$6\left(\dfrac{1}{2}-\dfrac{1}{3}x\right) \geqq 6\left(\dfrac{5}{6}+\dfrac{1}{2}x\right)$

$3-2x \geqq 5+3x$

$-2 \geqq 5x$

$x \leqq -\dfrac{2}{5}$

②より

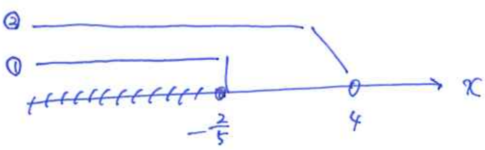
$10(1.4x-0.8) < 10\left(2.6-\left(\dfrac{1}{5}-0.6x\right)\right)$

$14x-8 < 26-10\left(\dfrac{1}{5}-0.6x\right)$

$14x-8 < 26-2+6x$

$8x < 32$

$x < 4.$



①, ②から．　$\underline{x \leqq -\dfrac{2}{5}}$