1. Solve for x, $\frac{|x-2|-1}{|x-2|-2} \leq 0$

Here

Use of formula $\frac{a}{b} \leq 0 \quad (b \neq 0)$

then a & b are of the opposite signs and Consider two cases.

CASE-1 $\Rightarrow$ $(|x-2|-1 \leq 0)$ and $(|x-2|-2 > 0)$ {since $|x-2|-2 \neq 0$}

$\Rightarrow (-1 \leq x-2 \leq 1)$ and $((x-2 < -2)$ or $(x-2 > 2))$

$\Rightarrow (+1 \leq x \leq 3)$ and $(x < 0$ or $x > 4)$

$\Rightarrow x \in [1,3] \cap (-\infty, 0) \cup (4, \infty)$

since there are no common values

$\Rightarrow x \in \{\phi\}$

CASE-2 $\Rightarrow$ $(|x-2|-1 \geq 0)$ and $(|x-2|-2 < 0)$

$\Rightarrow (|x-2| \geq 1)$ and $(|x-2| < 2)$

$\Rightarrow ((x-2 \leq -1)$ or $((x-2) \geq 1))$ and $(-2 < x-2 < 2)$

$\Rightarrow (x \leq 1$ or $x \geq 3)$ and $(0 < x < 4)$

$\Rightarrow x \in (-\infty, 1] \cup [3, \infty) \cap (0, 4)$

$\Rightarrow x \in (0, 1] \cup [3, 4)$

Hence the overall solution set of the given inequality will be the union of the sets obtained in two cases.

Hence, $x \in (0, 1] \cup [3, 4)$