Nama: Raffi Riau Navallah
Nim: 050640 827
UPBJJ: Purwokerto
Tugas 1 kalkulus

1. Diketahui $A = \{x \mid x^2 - 1 = 0\}$, $B = \{x \mid x^2 + x - 2 = 0\}$, dan

$C = \{x \mid x^3 - x^2 = 0\}$

$A, B, C \subset R$.

Tentukan : a. $A \cup (B \cap C)$

b. $(A \cup B) \cap C)$

e. $(A - B) \cup C$

Jawab :

$A = \{x \mid x^2 - 1 = 0\}$ $B = \{x \mid x^2 + x - 2 = 0\}$ $C = \{x \mid x^3 - x^2 = 0\}$

$x^2 - 1 = 0$ $x^2 + x - 2 = 0$ $x^3 - x^2 = 0$

$x^2 = 1$ $(x+2)(x-1) = 0$ $x^2(x-1) = 0$

$A = \qquad x = \pm 1$ $x = -2 \lor x = 1$ $x = 0 \lor x = 1$

                         $B = \{-2, 1\}$ $C = \{0, 1\}$

a). $A \cup (B \cap C)$

$= \{-1, 1\} \cup (\{-2, 1\} \cap \{0, 1\})$

$= \{-1, 1\} \cup \{1\}$

$= \{-1, 1\}$

b) $(A \cup B) \cap C)$

$= (\{-1, 1\} \cup \{-2, 1\}) \cap \{0, 1\}$

$= \{-2, -1, 1\} \cap \{0, 1\}$

$= \{1\}$

c) $(A - B) \cup C$

$(\{-1, 1\} - \{-2, 1\}) \cup \{0, 1\}$

$= \{-1\} \cup \{0, 1\}$

$= \{-1, 0, 1\}$

2. Tentukan himpunan penyelesaian pertidaksamaan :

a. $-5 \leq 2x - 5 < 5$

b. $\dfrac{2x + 1}{x - 1} < 3$

c. $|x - 3| \geq 2$

jawab:

2a) $-5 \leq 2x - 5 < 5$

$-5 + 5 \leq 2x - 5 + 5 < 5 + 5$

$0 \leq 2x < 10$

$0 \cdot \frac{1}{2} \leq 2x \cdot \frac{1}{2} < 10 \cdot \frac{1}{2}$

$0 \leq x < 5$

HP $= \{ x | 0 \leq x < 5, x \in R \}$

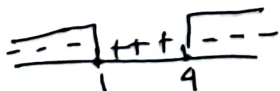2b) $\dfrac{2x + 1}{x - 1} < 3$

$\dfrac{2x + 1}{x - 1} - 3 < 0$

$\dfrac{2x + 1 - 3(x - 1)}{x - 1} < 0$

$\dfrac{2x + 1 - 3x + 3}{x - 1} < 0$

$\dfrac{-x + 4}{x - 1} < 0$

$x < 1$ atau $x > 4$

HP $\{ x | x < 1$ atau $x > 4 \}$

$$\begin{array}{c} \text{---]} + + +\text{[- - -} \\ \quad 1 \qquad 4 \end{array}$$

2c) $|x - 3| \geq 2$

$x - 3 \leq -2$ $x - 3 \geq 2$

$x - 3 + 3 \leq -2 + 3$ $x - 3 + 3 \geq 2 + 3$

$x \leq 1$ $x \geq 5$

HP $\{ x | x \leq 1$ atau $x \geq 5 \}$

3) Diketahui $f(x) = x^2 - 1$ dan $g(x) = \sqrt{x^2 - 1}$

Tentukan a. $(f \circ g)(x)$

        b. $(g \circ f)(x)$

Jawab :

3a) $(f \circ g)(x) = f(g(x))$

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

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

$= x^2 - 1 - 1$

$= x^2 - 2$

3b). $(g \circ f)(x) = g(f(x))$

$= g(x^2 - 1)$

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

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

$= \sqrt{(x^4 - x^2 - x^2 + 1) - 1}$

$= \sqrt{x^4 - 2x^2}$

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

$= x\sqrt{x^2 - 2}$

4) Gambarkan grafik fungsi $f(x) = \begin{cases} x^2 & , x < 1 \\ 2 & , x = 1 \\ -x + 1 & , x > 1 \end{cases}$

Jawab:

$f(x) = x^2, \ x < 1$

misal ambil $x = \{-5, -4, -3, -2, -1\}$

x	y	(x,y)
-5	25	(-5, 25)
-4	16	(-4, 16)
-3	9	(-3, 9)
-2	4	(-2, 4)
-1	1	(-1, 1)
0	0	(0, 0)
1	1	(1, 1)

$f(x) = 2, \ x = 1$

Jadi titik $(1, 2)$

$f(x) = -x + 1, \ x > 1$

x	y	(x, y)
1		
2	-1	(2, -1)
3	-2	(3, -2)
4	-3	(4, -3)
5	-4	(5, -4)
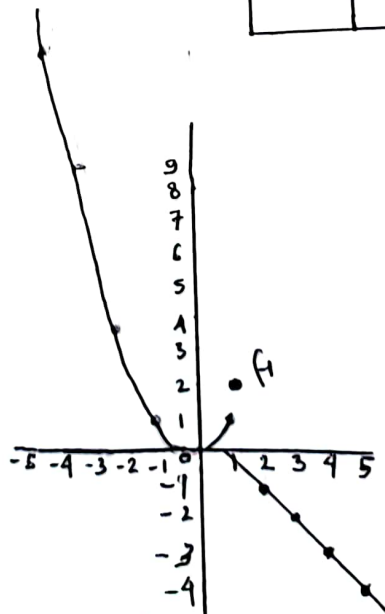
5a) $\lim\limits_{x \to -2} (x^2 + 3x + 1)$

$= (-2)^2 + 3(-2) + 1$

$= 4 - 6 + 1$

$= -1$

5b) $\lim\limits_{x \to 3} \dfrac{x^2 - 1}{x^2 + x - 2}$

$= \dfrac{3^2 - 1}{3^2 + 3 - 2}$

$= \dfrac{9 - 1}{9 + 3 - 2}$

$= \dfrac{8}{10}$

$= \dfrac{4}{5}$

6) Periksa, apakah $f(x) = |x - 1|$ kontinu di $x = 1$

Jawab:

Syarat kontinue

1) $f(x) = |x - 1|$

   $f(1) = |1 - 1|$

   $\quad\quad = |0|$

   $\quad\quad = 0$ (terdefinisi)

2) $\lim\limits_{x \to 1} |x - 1|$

   $= |1 - 1|$

   $= |0|$

   $= 0$ (ada)

3) $\lim\limits_{x \to 1} |x - 1| = f(1)$

   $\quad\quad\quad 0 \quad\quad = 0$

karena memenuhi 3 syarat maka $f(x) = |x - 1|$ kontinu di $x = 1$