

1-Matricula: 2021101014 = $12^2 = \frac{144}{8} = 18 = \text{resto } 0$ $a=0+1=1$

a) $x < x \Rightarrow x(x+1) - x(x-1) \Rightarrow x^2+x-x^2+x \Rightarrow 2x < 0$
 $x-0 \quad x+0 \quad (x-1)(x+1) \quad x^2+x-x^2+x \quad x^2-1$
 $\Rightarrow x^2-1 \rightarrow \Delta = 0^2 - 4 \cdot 1 \cdot (-1) = 4 \rightarrow x = \frac{0 \pm 2}{2} = -1 \rightarrow x = \frac{0-2}{2} = -1$
 $\hookrightarrow S = \{x \in \mathbb{R}; x < -1 \text{ ou } 0 < x < 1\}$

b) $-a^2 < x^2 - 2ax < 3a^2 \Rightarrow -1 < x^2 - 2x < 3$
 $-1 < x^2 - 2x \rightarrow x^2 - 2x + 1 > 0 \rightarrow \Delta = (-2)^2 - 4 \cdot 1 \cdot 1 = 4 - 4 = 0 \rightarrow x = \frac{2 \pm 0}{2} = 1$
 $x^2 - 2x < 3 \rightarrow x^2 - 2x - 3 < 0 \rightarrow \Delta = (-2)^2 - 4 \cdot 1 \cdot (-3) = 4 + 12 = 16 \rightarrow x = \frac{2 \pm 4}{2} = 3 \rightarrow x = \frac{2-4}{2} = -1$
 $\hookrightarrow S = \{x \in \mathbb{R}; -1 < x < 1 \text{ ou } 1 < x < 3\}$

c) $x-1 \leq x+1 \Rightarrow (x-1)(x-1) - (x+1)(x+1) \Rightarrow x^2-2x+1 - (x^2+2x+1) \Rightarrow -4x \leq 0$
 $x+1 \quad x-1 \quad (x+1)(x-1) \quad x^2-1 \quad x^2-1$
 $\Rightarrow x^2-1 \rightarrow \Delta = 0^2 - 4 \cdot 1 \cdot (-1) = 0 + 4 = 4 \rightarrow x = \frac{0 \pm 2}{2} = 1 \rightarrow x = \frac{0-2}{2} = -1$
 $\hookrightarrow S = \{x \in \mathbb{R}; -1 < x \leq 0 \text{ ou } x > 1\}$

d) $2x-2 > x+2 \Rightarrow (2x-1)(2x-1) - (x+1)(x+1) \Rightarrow 4x^2-2x-2x+1 - (x^2+x+x+1) = 3x^2-6x > 0$
 $x+2 \quad 2x-2 \quad (x+1)(x+1) \quad 2x^2-x+2x-1 \quad 2x^2+x-1$
 $3x^2-6x \rightarrow \Delta = (-6)^2 - 4 \cdot 3 \cdot 0 = 36 - 0 = 36 \rightarrow x = \frac{6 \pm 6}{6} = 2 \rightarrow x = \frac{6-6}{6} = 0$
 $2x^2+x-1 \rightarrow \Delta = 1^2 - 4 \cdot 2 \cdot (-1) = 1 + 8 = 9 \rightarrow x = \frac{-1 \pm 3}{4} = \frac{1}{2} \rightarrow x = \frac{-1-3}{4} = -1$
 $\hookrightarrow S = \{x \in \mathbb{R}; x < -1 \text{ ou } 0 < x < \frac{1}{2} \text{ ou } x > 2\}$

e) $-9a^2 < x^2 + 2ax - 8a^2 < 0 \Rightarrow -9 < x^2 + 2x - 8 < 0$
 $-9 < x^2 + 2x - 8 \rightarrow x^2 + 2x + 1 > 0 \rightarrow \Delta = 2^2 - 4 \cdot 1 \cdot 1 = 4 - 4 = 0 \rightarrow x = \frac{-2 \pm 0}{2} = -1$
 $x^2 + 2x - 8 < 0 \rightarrow \Delta = 2^2 - 4 \cdot 1 \cdot (-8) = 4 + 32 = 36 \rightarrow x = \frac{-2 \pm 6}{2} = 2 \rightarrow x = \frac{-2-6}{2} = -4$
 $\hookrightarrow S = \{x \in \mathbb{R}; -4 < x < -1 \text{ ou } -1 < x < 2\}$

2. $P_A = (1,0)$ $P_B = (0,1)$ $y = 1x$

$y - y_0 = m(x - x_0)$ $y - 0 = -1(x - 1)$ $-x + 1 = x$ $y = x$, logo $y = \frac{1}{2}$

$0 - 1 = m(1 - 0)$ $y - 0 = -1(x - 1)$ $2x = 1$ \hookrightarrow Resposta: $(\frac{1}{2}, \frac{1}{2})$

$m = \frac{-1}{1} = -1$ $y = -x + 1$ $x = \frac{1}{2}$

3. $y = x^2$ $P_A = (-1,2)$ $P_B = (1,1)$

$y - y_0 = m(x - x_0)$ $y - 2 = -\frac{1}{2}(x + 1)$ $x^2 = -\frac{1}{2}x + \frac{3}{2}$ $\Delta = \frac{1}{4} - 4 \cdot 1 \cdot \frac{3}{2} = \frac{1}{4} - 6 = -\frac{25}{4}$

$2 - 1 = m(-1 - 1)$ $y = -\frac{1}{2}x - \frac{1}{2} + 2$ $x^2 + \frac{1}{2}x - \frac{3}{2} = 0$ $x' = \frac{-\frac{1}{2} \pm \sqrt{\frac{1}{4} - 4 \cdot 1 \cdot (-\frac{3}{2})}}{2} = \frac{-\frac{1}{2} \pm \sqrt{\frac{25}{4}}}{2} = \frac{-\frac{1}{2} \pm \frac{5}{2}}{2}$

$m = \frac{1}{-2}$ $y = -\frac{1}{2}x + \frac{3}{2}$ $x'' = \frac{-\frac{1}{2} - \frac{5}{2}}{2} = -\frac{3}{2}$

$y = -\frac{1}{2} \cdot 1 + \frac{3}{2}$

$y = \frac{2}{2} = 1$

$y = -\frac{1}{2} \cdot \frac{3}{2} + \frac{3}{2}$

$y = \frac{3}{4} + \frac{3}{2} = \frac{3}{4} + \frac{6}{4} = \frac{9}{4}$

$P_1 = (1,1)$

$P_2 = (-\frac{3}{2}, \frac{9}{4})$

4. $f(x) = mx^2 + 2mx + 1$

$\Delta = (2m)^2 - 4 \cdot m \cdot 1 < 0$ \rightarrow não ter raiz real

$4m^2 - 4m < 0$

$\Delta = (-4)^2 - 4 \cdot 4 \cdot 0 = 16 \rightarrow x' = \frac{4 \pm 4}{8} = 1 \rightarrow x'' = \frac{4 - 4}{8} = 0$

$+++++0-----1++++$

$S = \{m \in \mathbb{R}; 0 < m < 1\}$