① $x^2 - ax + 1 \qquad 1 < x < 3$

$y = a(x-1)(x-3) \rightarrow x^2 - 4x + 3$

$a = 3 \qquad b = 3 \qquad a + b = 7$

---

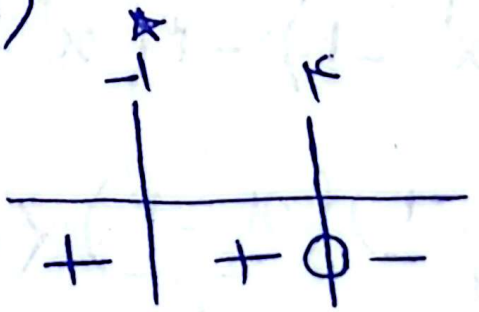
②

$y = ((k-2)x - m - 1)(x - 3n)^2$

$x = -1$ جفت ریشه

$-1 - 3n = 0$

$3n = -1 \rightarrow n = \frac{-1}{3}$



$x = 3 \rightarrow k - 2 < 0 \rightarrow k = 1$

$-x + m - 1 \longrightarrow -3 + m - 1 = 0 \rightarrow m = 4$

$\frac{m}{n} + k = \frac{4}{\frac{-1}{3}} + 1 = \boxed{-11}$

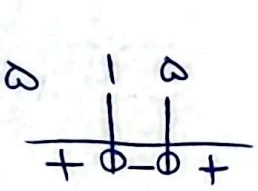
③

$\Delta < 0 \rightarrow (a-1)^2 - (4)(a-1) =$

$a^2 - 2a + 1 - 4a + 4 \qquad a^2 - 6a + 5$

$a < 0 \rightarrow a - 1 < 0 \rightarrow a < 1 \qquad (a-1)(a-5) < 0$

$1 \leqslant a < 5$ ← مجموعه جواب = تهی

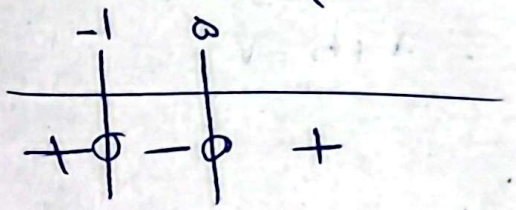


④

$y = -\frac{1}{2}x^2 + 2x + 6 \rightarrow y > \frac{7}{2}$

$-\frac{1}{2}x^2 + 2x + 6 > \frac{7}{2} \rightarrow -\frac{1}{2}x^2 + 2x - \frac{5}{2} > 0$

$x^2 - 4x - 5 < 0$



$-1 < x < 5$

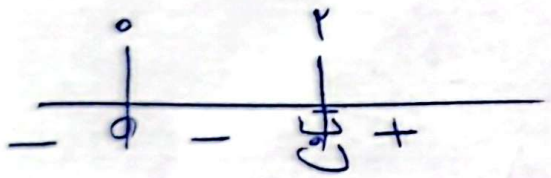
$a = -1$

$b = 5$

$b - a = 6$

⑤

$\frac{m(m^3 + m)}{m - 2} = \frac{m^2(m+1)}{m-2}$



$\rightarrow (2, +\infty)$

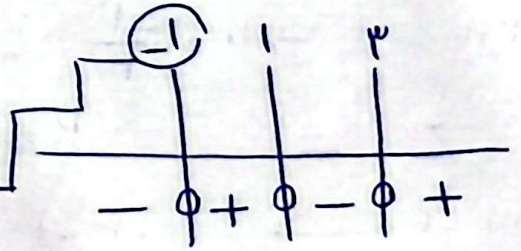
⑥

$x^3 - x + 3 - 3x^2$

$x(x^2 - 1) - 3(x^2 - 2)$

$(x^2 - 1)(x - 3) < 0$

(-1 و 1) (3)



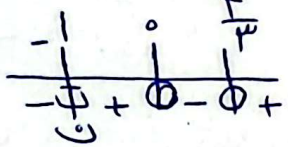
حذف مضروب جون $x > 0$

نقطه صحیح ← $(1, 3) = 2$

$(2^2 - 1)(2 - 3) = \underline{-3}$

⑥

I $\frac{3x^2-4x}{x+1} < 0 \rightarrow \frac{x(3x-4)}{x+1} < 0$



$x+1 > 0$

$x > -1$

$(-1, \frac{4}{3})$

II $\frac{3x^2-4x+x+1}{x+1} > 0$

$\frac{3x^2-4x}{x+1} + 1 > 0$

$\frac{3x^2-4x+x+1}{x+1} > 0$

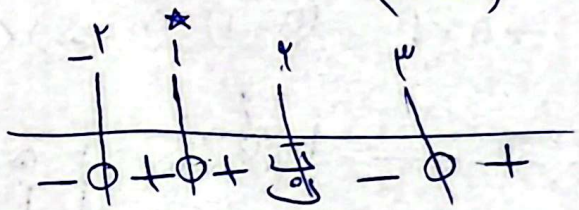
$x+1 > 0$

$x > -1$

$(-1, \infty)$

⑦

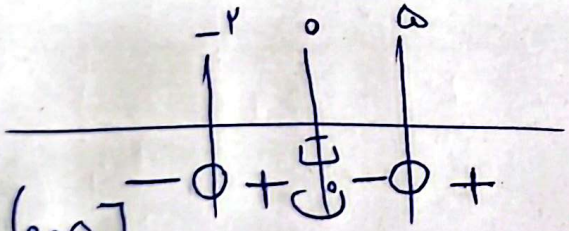
$\frac{x-1}{(x-3)^3} \rightarrow \frac{(x-3)(x+2)(x-1)^2}{(x-3)^3} > 0$



$D_f = (-\infty, -2) \cup (2, 3)$

⑩

$\frac{x^2-10-3x}{x} \geq 0$



$(-\infty, -2] \cup (0, 5]$

⑧

$\frac{3x^2-2x}{x^2+4} < 2$

$3x^2 - 2x < 2x^2 + 8$

$x^2 - 2x - 8 < 0$

$(x-4)(x+2)$

$-2 < x < 4$

$(-2, 4)$

$4 - (-2) = 6$