

$m^2 - am + b$

$\begin{cases} 1 - a + b = 0 \\ 9 - 4a + b = 0 \end{cases} \Rightarrow \begin{cases} -1 + a - b = 0 \\ 9 - 4a + b = 0 \end{cases} \Rightarrow \begin{cases} a = 1 \\ a = 4 \\ b = 3 \Rightarrow a + b = 7 \end{cases}$

$(a - 2m)^2 = 0 \Rightarrow a = 2m \Rightarrow m = -1 \Rightarrow a = -2 \Rightarrow m = \frac{-1}{2}$

$k - r = a \Rightarrow a > 0 \Rightarrow k - r < 0 \Rightarrow k < r \Rightarrow k = 1 \Rightarrow (k - r)x + m - 1 = 0$   
 $\frac{m}{n} + k = -1 \Rightarrow m = -n - k \Rightarrow m = -n - 1$

$-\frac{1}{r}m^2 + rm + 4 > \frac{k}{r} \Rightarrow -\frac{1}{r}m^2 + rm + 4 = \frac{k}{r} \Rightarrow -\frac{1}{r}m^2 + rm + \frac{4-r}{r} = 0$   
 $m = \frac{-r \pm \sqrt{r^2 - 4(1-r)(4-r)}}{2(-1)} \Rightarrow m = \frac{-r \pm \sqrt{r^2 - 4(4-r)(1-r)}}{-2}$   
 $\Rightarrow b = a \Rightarrow b - a = 4$

$f(m) = m^2 - 2m^2 - m + 4 = (m-1)(m^2 - 2m - 4) \Rightarrow m = 1 \text{ or } m = 1 \pm \sqrt{5}$   
 $\Rightarrow m = 1 \pm \sqrt{5}$

$(a-1)m^2 + (a-1)m + 1 < 0$   
 $\Delta < 0 \Rightarrow b^2 - 4ac < 0 \Rightarrow (a-1)^2 - 4(a-1) < 0$   
 $a^2 + 1 - 2a - 4a + 4 < 0 \Rightarrow a^2 - 6a + 5 < 0$   
 $a \in (1, 5)$

$m \in (r, +\infty) \Rightarrow m > r \Rightarrow m - r > 0 \Rightarrow m - r$   
 $\frac{m(m^2 + m)}{m - r} > 0$

$\frac{(m-r)(m+r)(m-1)(m-1)}{(m^2+m+1)(r-m)^2} \leq 0$   
 $m \in [-r, r] \cup [r, +\infty)$

$\frac{r^2m^2 - 2rm - r^2m^2 - 1}{m^2 + r} < 0 \Rightarrow \frac{m^2 - 2m - 1}{m^2 + r} < 0 \Rightarrow (m-1)(m+1) < 0$   
 $m \in (-1, 1)$

$\frac{m(m^2 - r)}{m+1} < 0 \Rightarrow m \in (0, \frac{r}{2})$

$\frac{m^2 - 1}{m} \leq r \Rightarrow \frac{m^2 - 2m - 1}{m} \leq 0 \Rightarrow (m-2)(m+1) \leq 0$   
 $m \in [-1, 2]$