

$$n(P_n) - n(P_{n-1}) = 2(n+1)$$

$$P(n) = ?$$

$$P(n) + n(P_{n-1}) = 2(n+1)$$

$$n(P_{n-1}) - n(P_{n-2}) = 2(n+1)$$

$$(1+n)P(n) = 2(n+1) + 2(n+1) - n$$

$$n \geq 0 \quad P(n) = P_{n+1} - P_n P_{n-1} = \frac{-P_n P_{n-1} + n + 1}{n+1}$$

$$n < 0 \quad P(n) = -P_n + 1 + P_n P_{n-1} - n = \frac{P_n P_{n-1} - P_n + 1}{n+1}$$

$$P(n^2) = ?$$

$$P(n^2) + P(n) = n^2 - P_n + 1$$

$$P(n) = 1 \rightarrow P(n) = 1$$

$$P(n) = n^2 - P_n + 1 \rightarrow P(n^2) = n^2 - P_n^2 + 1$$

$$y = \frac{n^2 + n + 1}{n-1}$$

$$ny - y = n^2 + n + 1$$

$$0 = n^2 + n(1-y) + 1+y$$

$$n = \frac{1-y \pm \sqrt{(1-y)^2 - 4(1+y)}}{2}$$

$$1+y^2 - 2y - 1 - 2y \geq 0 \quad y^2 - 4y - 1 \geq 0 \quad (y-2)^2 \geq 5 \quad \frac{-2 \pm \sqrt{5}}{1}$$

$$R_f = (-\infty, -1] \cup [2, +\infty)$$

$$y = P_n^2 - 2n + 1$$

$$n_{min} = \frac{a}{\varepsilon}$$

$$y_{min} = \frac{1}{n} - \frac{1}{n} + 1 = -\frac{1}{n}$$

$$R_f = [-\frac{1}{n}, +\infty)$$

$$y = \sqrt{-n^2 + 2n - 1}$$

$$n_{max} = \frac{-1}{-1} = 1$$

$$y_{max} = -1 + 1 - 1 = -1$$

$$\sqrt{(-\infty, 1]} = [0, 1]$$

$$y = \sqrt{\frac{1}{n} - \frac{1}{n^2} + 2n + 1}$$

$$\sqrt{(-\infty, +\infty)} = [0, +\infty)$$

$$y = \log(n^2 - 4n^2 + 2n + 1)$$

$$R_f = (0, +\infty)$$

الف) $\frac{r_{n+1}}{r_n - 2}$
 $112 - \{ \frac{r}{2} \}$

ب) $\sqrt{\frac{\Sigma n+1}{n-2}}$
 $\sqrt{112 - \{ \frac{r}{2} \}} = [-2, +\infty) \cup \{ \frac{r}{2} \}$

ج) $y = \frac{n^2 + \epsilon}{\sqrt{n^2 + 3}}$
 $y = \sqrt{n^2 + 3} + \frac{1}{\sqrt{n^2 + 3}} = \sqrt{3} + \frac{1}{\sqrt{3}} = \frac{4}{\sqrt{3}}$
 $\left[\frac{4}{\sqrt{3}}, +\infty \right)$

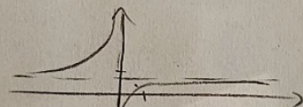
$y = \frac{n^2 + \epsilon}{n^2 + 2} - \epsilon$
 $\Rightarrow \left[\frac{1}{2} + \epsilon \right)$
 $\left(\frac{1}{2} + \epsilon, +\infty \right)$

$y = \frac{r_{n^2} + \epsilon}{n^2 - 1}$ $n^2 y - y = r_{n^2} + \epsilon$ $n^2 (y - \frac{1}{n^2}) = y + \epsilon$
 $n^2 = \frac{y + \epsilon}{y - \frac{1}{n^2}}$ $\frac{-\epsilon}{y - \frac{1}{n^2}} + \frac{1}{y - \frac{1}{n^2}} = \frac{\epsilon}{y - \frac{1}{n^2}}$
 $R_f = (-\infty, \frac{1}{2}] \cup (\frac{3}{2}, +\infty)$

$\rightarrow 0 \rightarrow -2$ منفرد و گسسته
 $\rightarrow +\infty \rightarrow 3$ $\rightarrow -\infty \rightarrow +\infty$ در هر یک از این دو ناحیه
 $R_f = (-\infty, -2] \cup (3, +\infty)$

$f(x) = \frac{2 \sin x + \epsilon}{\sin x - 2}$ $\max = 1$ $\frac{4}{-2} = -2$ $\frac{2}{-2} = -1$
 $\min = -1$ $\frac{4}{-2} = -2$ $\frac{2}{-2} = -1$
 $[-2, -\frac{1}{2}] = R_f$

الف) $y = \left| \frac{r_{n-1}}{\Sigma n} \right|$
 $\frac{r}{2}$



ب) $\sqrt{\frac{9n-11}{\Sigma n-1} \frac{9(n-2)}{\Sigma(n-2)}}$ $\left[\frac{1}{2}, 1 \right]$
 $R_y = \{ \frac{3}{2} \}$

$R_f = [0, +\infty)$

$y = n|a| - r_n$

$n \rightarrow \infty$ $n^2 - r_n$
 $n \rightarrow -\infty$ $-n^2 - r_n$
 $n(-n-2)$

