

$$\left(\frac{1}{n}\right)^r + \left(\frac{1}{1-n}\right)^r = \frac{140}{9} \Rightarrow \left(\frac{1}{n} + \frac{1}{1-n}\right)^r - r \left(\frac{1}{n} \times \frac{1}{1-n}\right) = \frac{140}{9}$$

$$\left(\frac{1}{n-n^2}\right)^r - \frac{r}{n-n^2} = \frac{140}{9} \Rightarrow \frac{1}{n-n^2} = t \quad t^r - rt + 1 = \frac{140}{9} + 1$$

$$(t-1)^r = \frac{149}{9} \quad t-1 = \pm \sqrt[r]{\frac{149}{9}} \quad t = \frac{14}{9} \Rightarrow \frac{1}{n-n^2} = \frac{14}{9} \Rightarrow -n^2 + n = \frac{r}{14}$$

$$\frac{1}{n-n^2} = \frac{-10}{9} \Rightarrow -n^2 + n = \frac{-r}{10} \Rightarrow S_r = 1 \quad S_1 = 1$$

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

$$\sqrt{-x^2 + 4x + 1} \geq x^2 - 4x + 1 \leq 0 \Rightarrow (x-2)(x-1) \leq 0 \Rightarrow [1, 2]$$

$$\sqrt{-x^2 + 4x + 1} \geq x^2 - 4x + 1 \leq 0 \Rightarrow (x^2 - 2x + 1) - (x^2 - 4x + 1) \leq 0 \Rightarrow 2x \leq 0 \Rightarrow x \leq 0$$

$$(x-2)(x-1) \leq 0 \Rightarrow x \in [1, 2] \quad (1) \quad (2) \Rightarrow x = 1$$

$$\sqrt{1} + \sqrt{-1^2 + 4(1) + 1} + \sqrt{1^2 + \sqrt{-1^2 + 4(1) + 1} - 1} = 1 + 2 = 3 = 3$$

$$y = |x+r| + |n-1| \quad y + n = 1 \quad y - n = -1$$

$$\begin{cases} y + n = -1 \\ y + n = 1 \end{cases} \Rightarrow \begin{cases} y = -1 \\ n = 0 \end{cases} \Rightarrow B$$

$$\begin{cases} y - n = 1 \\ y + n = 1 \end{cases} \Rightarrow \begin{cases} y = 1 \\ n = 0 \end{cases} \Rightarrow A$$

$$AB = \sqrt{0^2 + 4^2} = \sqrt{16} = 4$$

$$y = \frac{1}{r}n + r \quad y = \sqrt{x^2 - 4x + 4}$$

$$\begin{cases} y - n = -r \\ -y + \frac{n}{r} = -r \end{cases} \Rightarrow \begin{cases} y = -r \\ n = -r^2 \end{cases} \Rightarrow A$$

$$\begin{cases} y - n = -r \\ y + n = 1 \end{cases} \Rightarrow \begin{cases} y = \frac{1-r}{2} \\ n = \frac{1+r}{2} \end{cases} \Rightarrow B$$

$$BC = \sqrt{4 + 4} = 2\sqrt{2}$$

$$S = \frac{2\sqrt{2} \times 4\sqrt{2}}{2} = 12$$

$$\frac{1}{n} + \frac{1}{n+9} = \frac{1}{10}$$

$$\frac{x+9+x}{x^2+9x} = \frac{1}{10} \Rightarrow \frac{2x+9}{x^2+9x} = \frac{1}{10}$$

$$10x + 110 = x^2 + 9x$$

$$x^2 - x - 110 = 0$$

$$(x-11)(x+10) = 0 \Rightarrow x = 11 \text{ or } x = -10$$