

$$2m^2 + y^2 - 4m + 4y + k = 0 \rightarrow \frac{2m^2 - 4m + k}{2} + \frac{y^2 + 4y + k}{2} = 0$$

$$\div 2 \rightarrow m^2 - 2m + \frac{k}{2} + \frac{y^2 + 4y + k}{2} = 0$$

$$\frac{y^2 + 4y + k}{2} \rightarrow \frac{y^2}{4} \rightarrow k = 9$$

$$m^2 - 2m + 1 \rightarrow \frac{k}{2} = 1 \rightarrow k = 2$$

$$k = 2 + 9 = 11$$

$$f(n) = \begin{cases} n^2 + 2n & ; n \geq a \\ 2n + a + 2 & ; n < a \end{cases}$$

$$n = a \rightarrow a^2 + 2a = 2a + a + 2 \Rightarrow a^2 + a - 2 = 0$$

$$(a+2)(a-1)$$

$$a = 1, -2$$

$$f(1) = 2(1) + 1 + 2 = 5$$

$$f(m) = \begin{cases} 2m^2 - b & ; |m+1| \geq 2 \rightarrow |m+1| \geq 2 \rightarrow m \geq 1 \rightarrow m \leq -3 \\ a + 2m & ; -3 \leq m \leq -1 \end{cases}$$

$$m = -3 \rightarrow 2(-3)^2 - b = a + 2(-3) \rightarrow 18 - b = a - 6 \rightarrow a + b = 24$$

$$y = \sqrt{4m - a} + \sqrt{b - 2m} \rightarrow 4m - a \geq 0 \rightarrow m \geq \frac{a}{4}$$

$$b - 2m \geq 0 \rightarrow m \leq \frac{b}{2} \rightarrow \frac{a}{4} \leq \frac{b}{2} \rightarrow \frac{a}{2} \leq b \rightarrow \frac{b}{a} \geq \frac{1}{2} \rightarrow \frac{b}{a} = \frac{4}{12} = \frac{1}{3}$$

$$y = \sqrt{\frac{m+1}{1m-1}} + \sqrt{\frac{4-m}{m^2+m+2}}$$

$$\frac{-1}{-1} + \frac{1}{1} \rightarrow P_f = [-1, +\infty) - \{1\} \text{ I}$$

$$\frac{4}{+1} - \frac{1}{-1} \rightarrow P_f = (-\infty, 4] \text{ II}$$

$$I \cap II \rightarrow P_f = [-1, 4] - \{1\}$$

$$y = \sqrt{[m] - 4} + \sqrt{1 - [m]}$$

$$[m] - 4 \geq 0 \rightarrow [m] \geq 4 \rightarrow m \geq 4 \rightarrow P_f = [4, +\infty) \text{ I}$$

$$1 - [m] \geq 0 \rightarrow [m] \leq 1 \rightarrow m \leq 1 \rightarrow P_f = (-\infty, 1) \text{ II}$$

$$I \cap II \rightarrow P_f = \emptyset$$

