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$$a) \sqrt{\frac{n-1}{n} - \frac{n}{n-1}} \geq 0 \Rightarrow \frac{(n-1)^2 - n^2}{n^2 - n} \geq 0$$

$$\Rightarrow \frac{n^2 - 2n + 1 - n^2}{n^2 - n} \geq 0$$

$$\frac{-2n + 1}{n(n-1)} \geq 0$$

$$(-\infty, \frac{1}{2}] \cup [1, +\infty)$$

$$R = \{0, -1\}$$

$$R = \{1, -2\}$$

$$R = \{0, 1, -1, -2\}$$

$$b) \frac{1}{n+1} - \frac{1}{n}$$

$$\frac{n}{n-1} + \frac{1}{n+2}$$

$$f(n) = \left(\frac{1}{n}\right)^n - n \left(\frac{1}{n}\right)^{n-1} = \left(\frac{1}{n}\right)^n (1 - n)$$

$$(-\infty, 1/n)$$

$$n = 2 \Rightarrow (-\infty, -1/2)$$

$$(-\infty, -1/2)$$

$$c) \sqrt{x-1} + \sqrt{y+1} = n$$

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

$$n=1, 2, 3, \dots \Rightarrow n \geq 1$$

$$[1, +\infty)$$

$$d) \frac{(n^2 - n - 2)}{n^2 - n - 2} \Rightarrow n^2 - n - 2 > 0 \Rightarrow (n-2)(n+1) > 0 \Rightarrow (-\infty, -1) \cup (2, +\infty)$$

$$\sqrt{n-1} + 1 = R = \{1\} \Rightarrow (-\infty, 1) \cup (2, +\infty)$$

$$f(n) = \sqrt{n^2 + n - n^2} \Rightarrow n^2 - n - 2 \geq 0 \Rightarrow \frac{n}{n} + (-\frac{1}{n}) \cdot \frac{n}{n} \neq 1$$

$$f(n) = \sqrt{n^2 - \frac{1}{n}n + n} \Rightarrow \sqrt{n^2 + n - 1} \geq 0 \Rightarrow n^2 + n - 1 \geq 0$$

$$g(n) = \sqrt{f(n) - n} \Rightarrow \text{if } n \geq 1 \Rightarrow \sqrt{n^2 - n - n} = \sqrt{-n}$$

$$n^2 - n \geq 0 \Rightarrow n \geq 1 \Rightarrow [1, +\infty) \text{ if } n < 1 \Rightarrow \sqrt{n^2 + n - n} = \sqrt{n}$$

$$f(\sin \frac{\pi}{4}, \cos \frac{\pi}{4}) \Rightarrow f(n) \quad f(\frac{\sqrt{1-r}}{r}) = f(1 + \frac{\sqrt{1-r}}{r})$$

$$\frac{\sqrt{1-r}}{r} = 1 \Rightarrow \boxed{\frac{1+\sqrt{1-r}}{r}}$$

$$n \cdot (1 + \frac{\sqrt{1-r}}{r})$$

$$f(n) = r^n - \epsilon n \Rightarrow r(n^r - r) \Rightarrow r \left[\left(1 + \frac{\sqrt{1-r}}{r}\right)^r - r \right] = r \left[1 + \frac{r}{r} + \sqrt{1-r} - r \right] \Rightarrow \boxed{\sqrt{1-r} - \frac{1}{r}}$$

$$f(n) \cdot \frac{n+1}{n-1} \Rightarrow f(n) \cdot \frac{a+1}{a-1} \quad f(f(n)) \cdot a$$

$$\frac{\frac{a+1}{a-1} + \frac{a-1}{a-1}}{\frac{a+1}{a-1} - \frac{a-1}{a-1}} = a \Rightarrow \boxed{a \cdot R - f}$$

$$f(g(a)) = -\epsilon \quad f(0) = -\epsilon \quad n^r - \epsilon n = -\epsilon \Rightarrow n^r - \epsilon n + \epsilon = 0 \Rightarrow (n-r)^r$$

$$n = r \Rightarrow g(a) = r$$

$$\sqrt{n^r - 1} = r \Rightarrow n^r - 1 = r^2 \Rightarrow n^r = r^2 + 1 \Rightarrow \boxed{n = \sqrt[r]{r^2 + 1}} \quad \boxed{a = \sqrt[r]{r^2 + 1}}$$

$$f(n+r) = n^r - \omega n + r \quad f(r) \times f(-r) = 0 \quad r \times \sqrt{r} < \boxed{1 \text{ if } r}$$

$$f(n+r) \stackrel{n=1}{=} f(r) = (1)^r - \omega(1) + r = f(r) \stackrel{r}{=} \boxed{r}$$

$$f(n+r) = f(-r) \Rightarrow n = -r \Rightarrow f(-r) \stackrel{n=-r}{=} r^r - \omega(-r) + r = r^r + r + r = \boxed{\sqrt{r}}$$

$$f(\cos^r + \omega \cos) \Rightarrow \epsilon \cos^r + \omega \cos = \epsilon \cos^r + \omega \cos = \cos = n \Rightarrow n^r + \omega n - 1 = \epsilon$$

$$\binom{r}{n+r} \binom{r}{n-r} \stackrel{r}{=} \cos n \cdot \frac{r}{r} \times \left(f(\cos^r + \cos n) \cdot \tan^r n = \cos \cdot \frac{r}{r} \right)$$

$$\cos \in [-1, 1] \quad \cos \cdot \frac{r}{r} \geq \frac{1}{r} \Rightarrow (1^0, 1^0) \Rightarrow \left(\frac{\pi}{r}, \frac{r}{r} \right) \quad \frac{r}{r} \cdot \frac{r}{r} \cdot (\sqrt{r})^r = \boxed{\mu}$$

thank you