

$$\lim_{u \rightarrow -r^+} f(u) = f(l) + 0 = f \quad u > -r \quad -u < r \quad r-u < f \quad \frac{r-u}{r} < r \quad u+r > 0 \quad \frac{u+r}{r} > 0 \quad (1)$$

$$\lim_{u \rightarrow -r^-} f(u) = f(r) - a \quad u < -r \quad -u > r \quad r-u > f \quad \frac{r-u}{r} > r \quad u+r < 0 \quad \frac{u+r}{r} < 0$$

$$\lim_{u \rightarrow -r^+} f(u) = \lim_{u \rightarrow -r^-} f(u) \quad r = f - a \quad a = r \quad \left[\frac{a}{r}\right] = \left[\frac{r}{r}\right] = 0 \quad \checkmark$$

$$\lim_{u \rightarrow -\frac{1}{r}} [\lambda u^r - u] = [0^-] = -1 \quad u(\lambda u^r - 1) \rightarrow \begin{cases} u=0 \\ u=\pm \sqrt[r]{\lambda} \end{cases} \quad (r) \quad \lim_{u \rightarrow (\frac{\pi}{2})^-} [r \sin u - 1] = [0^-] = -1 \quad (2)$$

$$\lim_{u \rightarrow (-\frac{1}{r})^-} \log u - a + \left[\frac{r}{u^r}\right] = \frac{-a - a + 11}{-1 - (-1)} = \frac{1}{0} = -\infty \quad u < -\frac{1}{r} \quad u^r > \frac{1}{r} \quad \frac{1}{u^r} < r \quad \frac{r}{u^r} < 1 \quad \frac{r}{u^r} < 1 \quad \frac{r}{u^r} > -1 \quad (3)$$

$$\lim_{u \rightarrow 1^+} \frac{\sin^r \pi u}{[u] + \cos \pi u} = \lim_{u \rightarrow 1^+} \frac{\sin^r \pi u}{1 + \cos \pi u} = \frac{\sin^r \pi}{1 + \cos \pi} = \frac{1 - \cos^r \pi}{1 + \cos \pi} = \frac{(1 - \cos \pi)(1 + \cos \pi)}{1 + \cos \pi} = 1 - \cos \pi = r \quad (4)$$

$$\lim_{u \rightarrow -1} \frac{\sqrt[r]{ru+r} - \sqrt[r]{ru+f}}{1 + \sqrt[r]{u}} = \lim_{u \rightarrow -1} \frac{(\sqrt[r]{ru+r} - \sqrt[r]{ru+f})(\sqrt[r]{ru+r} + \sqrt[r]{ru+f})}{(1 + \sqrt[r]{u})(\sqrt[r]{ru+r} + \sqrt[r]{ru+f})} = \lim_{u \rightarrow -1} \frac{ru+r - ru-f}{(1 + \sqrt[r]{u})(\sqrt[r]{ru+r} + \sqrt[r]{ru+f})} \quad (5)$$

$$= \lim_{u \rightarrow -1} \frac{-(u+1)}{(1 + \sqrt[r]{u}) \times r} = \lim_{u \rightarrow -1} \frac{-(\sqrt[r]{u^r} - \sqrt[r]{u^r} + 1)}{r} = -\frac{r}{r}$$

$$\lim_{u \rightarrow 1} \frac{ru - \sqrt[r]{ru} + a}{ru - \sqrt[r]{ru} + 1} \xrightarrow{\text{hop}} \lim_{u \rightarrow 1} \frac{r - \frac{r}{\sqrt[r]{u}}}{r - \frac{r}{\sqrt[r]{u}} + 1} = \frac{-\frac{r}{r}}{\frac{a}{f}} = -\frac{r}{a} \quad (6)$$

$$\lim_{u \rightarrow 0} \frac{a + \sqrt{bu+c}}{u} \xrightarrow{\text{hop}} \lim_{u \rightarrow 0} \frac{\frac{b}{\sqrt{bu+c}}}{1} = \frac{1}{f} \quad \text{چون مخرج صفر است ولی حاصل حد یک عدد است پس حد صورت صفر است.} \quad (7)$$

$$a + \sqrt{b(0)+c} = 0 \quad a = -\sqrt{c} \quad \frac{b}{r\sqrt{c}} = \frac{1}{f} \quad b=1 \quad c=f \rightarrow a = -r \quad \frac{ab}{c} = \frac{-r}{f} = -\frac{1}{r}$$

$$\lim_{u \rightarrow -r\pi} \frac{f + K\left[\frac{u}{r}\right]}{\sin u} = +\infty \quad u \rightarrow -r\pi^+ : \frac{f + K[-r^+]}{0^+} = +\infty \quad f - rK > 0 \quad K < r \quad (8)$$

$$u \rightarrow -r\pi^- : \frac{f + K[-r^-]}{0^-} = +\infty \quad f - rK < 0 \quad K > \frac{f}{r} \quad \frac{f}{r} < K < r \rightarrow -r < -K < -\frac{f}{r} \quad [-K] = -r$$

$$\lim_{u \rightarrow 1} \frac{b\sqrt{r+\sqrt{u}} - rb}{au - b} \xrightarrow{\text{hop}} \lim_{u \rightarrow 1} \frac{b\left(\frac{1}{r\sqrt{r+\sqrt{u}}}\right)}{a} = \frac{b}{fa} \quad (9)$$

$$b = 1a \rightarrow \frac{1}{f}$$

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 $1a - b = 0 \quad b = 1a$