B

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۱) $y=x^2 \begin{cases} x=1 \to y=1 \\ x=3 \to y=9 \end{cases} \to f(x)=3^{Ax+B} \begin{cases} 1=3^{A+B} \\ 9=3^{3A+B} \end{cases}$

$$\begin{cases} 3A+B=2 \\ -A-B=0 \end{cases} \to 2A=2 \to A=1 \to B=-1$$

$$f(x)=3^{x-1} \to x=0 \to f(0)=\frac{1}{3}$$

$y=?$

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۲) $2^{2x} \times 2^3 = (2^x)^2 + 12 \to 2^x = t \to 8t = t^2+12 \to (t-3)(t-4)=0$

$2^x=3 \to g_2^3 = x$

$2^x=4 \to g_2^4 = x$

$\xrightarrow{+} g_2^3 + g_2^4 = g_2^{12} \simeq 3$

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۳) $(g_{21}^3)^2 + (g_{21}^{21} + g_{21}^{21} - g_{21}^3)(g_{21}^{21} + g_{21}^{21} + g_{21}^3)$

$= (g_{21}^3)^2 + (2 - g_{21}^3)(2 + g_{21}^3) = (g_{21}^3)^2 + 4 - (g_{21}^3)^2$

$= 4$

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۴) $g^{(1-x)^2} + 4g^{(1-x)} = 5 \to 5g^{(1-x)} = 5 \to g^{(1-x)} = 1$

$1-x = 10 \to x = -9 \to g_3^{-(-9)} = 2$

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۵) $(x^2+2x+4)(x-2) = 18 \to x^3 - 2x^2 + 2x^2 - 4x + 4x - 8 = 18$

$x^3 = 14 \to x = \sqrt[3]{14}$

$g_{2\sqrt[3]{4}}^{14\frac{1}{3}} = 4$

(۹)

$$\lim_{x\to 1}\frac{(2-x)(x-2)^2}{1-x^3}=\lim_{x\to 1}\frac{(2-x)^3}{(1-x)(1+x+x^2)}=\frac{1}{3}\lim_{x\to 1}\frac{(2-x)^2}{1+x+x^2}=\frac{1}{3}$$

$$(2-x)^3=10^3 \Rightarrow 2-x=10 \Rightarrow x=-8$$

$$\lim_{\sqrt{2}}^{8}=2\times 2\lim_{2}^{2}=4$$

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(۷)

$$\frac{3^{x^2}}{3^2}=3^{6x} \Rightarrow 3^{x^2}=3^{6x}\times 3^2 \Rightarrow x^2=6x+2 \Rightarrow x^2-6x-2=0$$

$$x=\frac{6\pm\sqrt{44}}{2} \Rightarrow 2+\sqrt{11}=x \Rightarrow \lim_{4}^{2+\sqrt{11}-2}=\frac{1}{2}$$

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(۸)

$$\lim_{18}^{1}\to\frac{\lim_{3}^{2^3}}{\lim_{3}^{3^2}+\lim_{3}^{2}}=\frac{3\times\frac{5}{8}}{\underbrace{2+\frac{5}{8}}_{\frac{21}{8}}}=\frac{\frac{15}{8}}{\frac{21}{8}}=\frac{15}{21}=\frac{5}{7}$$

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(۹)

$$\lim_{12}^{4}\to\frac{\lim_{4}^{3}+\lim_{4}^{2}}{\lim_{4}^{3}+\lim_{4}^{4}}=\frac{\%8+\%5}{\%8+1}=\frac{1,3}{1,8}=\frac{13}{18}$$

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(۱۰)

$$x=-1 \Rightarrow a\lim_{2}^{2}+b\lim_{2}^{1}-a=0 \Rightarrow (a+b)\lim_{2}^{2}=a$$

$$10^a=2^a\times 2^b \Rightarrow 2^b=5^a \Rightarrow 2^{\frac{b}{a}}=5 \Rightarrow \left(\sqrt{2}\right)^{\frac{b}{a}}=2^{\frac{b}{a}\times\frac{1}{2}}$$

$10^a \swarrow \searrow 2^a\times 5^a$

$$\sqrt{5}=5^{\frac{1}{2}}$$