

$f(x) = 3^{Ax+B}$, $y = x^2$ قطع کند $x=1 \Rightarrow y=1$ $3^{A+B} = 1 \Rightarrow 3^0 = 1 \Rightarrow A+B=0$
 $x=2 \Rightarrow y=9$ $3^{2A+B} = 9 \Rightarrow 3^2 = 9 \Rightarrow 2A+B=2$
 $f(x) = 3^{x-1}$ $x=0 \Rightarrow y = 3^{-1} = \frac{1}{3}$ ✓ $(0, \frac{1}{3})$
 \downarrow
 $2A+B=2$
 \downarrow
 $A+B=0$
 \downarrow
 $B=-1$ ✓

$\log_2(x^2+1) = x+2 \Rightarrow 2^{x^2+1} = 2^{x+2} \Rightarrow 2^{x^2+1} = 2^{x+2}$ $x=t$
 $t^2+1=2t \Rightarrow t^2-2t+1=0 \Rightarrow (t-1)^2=0 \Rightarrow t=1$
 $x=1 \Rightarrow x = \log_2 2$
 $x=1 \Rightarrow x = \log_2 2$
 $\log_2 2 + \log_2 4 = \log_2 8$ ✓

$(\log_{21} 2)^2 + \log_{21} 12 \log_{21} 14 = (\log_{21} 2)^2 + (\log_{21} 2 + 1)(\log_{21} 2 + 2) = (\log_{21} 2)^2 + (\log_{21} 2 \log_{21} 2) + \log_{21} 2 + \log_{21} 2 + \log_{21} 2 + \log_{21} 2 + 2$
 $(\log_{21} 2)^2 + (\log_{21} 2 \log_{21} 2) + \log_{21} 2 + 2 = \log_{21} 2 (\log_{21} 2 + \log_{21} 2) + \log_{21} 2 + 2 = \log_{21} 2 + \log_{21} 2 + 2 = 1 + 2 = 3$ ✓

$\log_2(x^2-2x+1) + 3 \log_2(1-x) = 5 \Rightarrow \log_2(x-1)^2 + 3 \log_2(1-x) = 5 \Rightarrow \log_2(1-x)^2 + 3 \log_2(1-x) = 5$
 $\Rightarrow 2 \log_2(1-x) + 3 \log_2(1-x) = 5 \Rightarrow 5 \log_2(1-x) = 5 \Rightarrow \log_2(1-x) = 1 \Rightarrow 1-x = 2 \Rightarrow x = -1$ ✓
 $\log_2(-x) = \log_2 2 = 1$ ✓

$\log_2(x^2+2x+4) + \log_2(x-2) = 5 \Rightarrow \log_2(x^2+2x+4)(x-2) = 5 \Rightarrow (x^2+2x+4)(x-2) = 32 \Rightarrow x^3 - 4x^2 + 8x - 8 = 32$
 $x^3 = 40 \Rightarrow x = \sqrt[3]{40}$
 $\log_{\sqrt[3]{40}} x = \log_{\sqrt[3]{40}} \sqrt[3]{40} = \frac{\frac{1}{3}}{\frac{1}{3}} \log_2 2 = 1 \log_2 2 = 1$ ✓

$$\log(x-x) - \log \frac{1}{(x-x)^2} = 3 \Rightarrow \log(x-x) - \log 1 + \log(x-x)^2 = 3 \Rightarrow \log(x-x) + 2 \log(x-x) = 3$$

$$\Rightarrow 3 \log(x-x) = 3 \Rightarrow \log(x-x) = 1 \Rightarrow x-x = 1 \Rightarrow x = -1 \checkmark$$

$$\log \frac{(-x)}{\sqrt{x}} = \log \frac{1}{\sqrt{x}} = \log \frac{1}{x^{1/2}} = 4 \log \frac{1}{x} = 4 \checkmark$$

$$\log(x-x) = 9 \quad x^{x-x} = 11^x \Rightarrow x^{x-x} = (11^x)^x \Rightarrow x^{x-x} = 11^{x^2} \Rightarrow x^{x-x} = 11^{x^2} \Rightarrow x^{x-x} = 11^{x^2}$$

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

$$\log \frac{(1+\sqrt{x-x})}{x} = \log \frac{\sqrt{x}}{x} = \log \frac{1}{\sqrt{x}} = \frac{1}{x} \checkmark$$

$$\log \frac{x}{x} = \frac{a}{x} \quad \log \frac{1}{11} = \frac{\log \frac{1}{x}}{\log \frac{1}{x}} = \frac{3 \log \frac{1}{x}}{\log \frac{1}{x} + \log \frac{1}{x}} = \frac{3 \times \frac{a}{x}}{2 + \frac{a}{x}} = \frac{3a}{2x + a}$$

$$\frac{3a}{2x + a} = \frac{10}{x} = \frac{10}{x} = \frac{10}{x} = \frac{a}{x} \checkmark$$

$$\log \frac{x}{x} = 0,1 = \log \frac{x}{x} = \frac{1}{x} \log \frac{x}{x} \Rightarrow \log \frac{x}{x} = 1,9$$

$$\log \frac{4}{11} = \frac{\log \frac{4}{x}}{\log \frac{11}{x}} = \frac{\log \frac{4}{x} + \log \frac{x}{x}}{\log \frac{11}{x} + \log \frac{x}{x}} = \frac{1,9 + 1}{1,9 + 2} = \frac{2,9}{3,9} \checkmark$$

$$(a \log x)x^x + ax + b \log x = 0$$

$$x=1 \Rightarrow x \log x - a + b \log x = 0 \Rightarrow \log x(a+b) - a = 0 \Rightarrow \log x(a+b) = a \stackrel{a+b}{\Rightarrow} \log x \left(1 + \frac{b}{a}\right) = 1$$

$$1 + \frac{b}{a} = \frac{1}{\log x} \Rightarrow 1 + \frac{b}{a} = \frac{\log 1}{\log x} = \log \frac{1}{x} \Rightarrow \frac{b}{a} = \log \frac{1}{x} - 1 = \log \frac{1}{x} - \log x = \log \frac{1}{x^2} \Rightarrow \frac{b}{a} = \log \frac{1}{x^2}$$

$$\left(\sqrt{x}\right)^{\frac{b}{a}} = \sqrt{x} \log \frac{1}{x^2} = \omega \log \frac{1}{x^2} = \omega \frac{1}{x^2} = \sqrt{\omega} \checkmark$$