

1. $u=1 \rightarrow a+b^*$ $f'(u) = \begin{cases} 1 & u < 1 \\ \frac{2u}{\sqrt{u}} & u \geq 1 \end{cases}$ در $u=1$ مشتق پذیر نیست $\rightarrow 1 = \frac{2b}{\sqrt{b}} \Rightarrow \frac{2b}{\sqrt{b}} = 1 \rightarrow b = \frac{1}{4}$ $\rightarrow a+b=2$ $\rightarrow a = \frac{7}{4}$ $\rightarrow$ طبق $a = \frac{1}{4}$

2. $u=1 \rightarrow r-u-f \leq 0 \Rightarrow f(u) = \frac{-r+1}{\sqrt{u}} \Rightarrow f'(u) = \frac{-r}{2\sqrt{u}} = \frac{-r}{2\sqrt{1}} = \frac{-r}{2}$ $\Rightarrow f'(1) = \frac{-r(1) - \frac{r}{2}(1)}{1} = \frac{-1}{2}$

3. $g(u) = \frac{1-u-r+\sqrt{u}}{\sqrt{u}}$ $u=1 \rightarrow u-r \leq 0 \Rightarrow g(u) = \frac{r-u+\sqrt{u}}{\sqrt{u}}$

$g'(u) = (-1 + \frac{1}{2\sqrt{u}}) \sqrt{u} - \frac{r-u+\sqrt{u}}{2\sqrt{u}^2} = \frac{(-1 + \frac{1}{2\sqrt{u}}) - \frac{r}{2\sqrt{u}} + \frac{1}{2}}{1} = \frac{-1}{2}$

$f'(1) - 2g'(1) = \frac{-1}{2} - 2(\frac{-1}{2}) = \frac{-1}{2} + 1 = \frac{1}{2} = \frac{\sqrt{2}}{2}$

3. $ba+c = \frac{1}{a} \rightarrow \frac{1}{a^2} + c = \frac{1}{a} \Rightarrow c = \frac{1}{a} - \frac{1}{a^2} \Rightarrow ac = 1$ $\rightarrow b = \frac{1}{u^2} \rightarrow b = \frac{1}{a^2}$

4. $f'(u) = \begin{cases} 0 & u < a \\ m(u-a)^{m-1} & u > a \end{cases}$ $\rightarrow$ در صورت تقیید $u-a \leq 0 \Rightarrow m-1 < 0 \Rightarrow m < 1$ $\rightarrow$ خروج بار

$m=0 \rightarrow f'(a) = f'_-(a)$ $\rightarrow$ لغتانی چون در نقاط گسسته مشتق چپ و راست نباید برابر شوند $m=1 \rightarrow \begin{cases} f'(a) = 0 \\ f'_-(a) = 1 \end{cases} \rightarrow f'(a) \neq f'_-(a)$ $\rightarrow m=1 \checkmark$

5. $g'(u) = \frac{1}{2u^2}$ $f(u) = \frac{1}{\sqrt{u}} \rightarrow f(u) = \frac{1}{\sqrt{2 \cdot \frac{1}{u}}} = u \rightarrow (f(u))' = 1$

6. $y = -a\alpha - \omega \Rightarrow (r, \alpha, \omega) \rightarrow f(r) = -r\alpha - \omega \rightarrow f'(r) = -\alpha \rightarrow f'(r) = -\alpha \rightarrow \alpha = -\frac{r}{2}$ $y = \frac{r}{2}u - \alpha \rightarrow f(u) = \frac{r}{2}u - \alpha = \frac{1}{2} \rightarrow f'(u) = \frac{r}{2} \rightarrow \frac{f'(u)}{f'(r)} = \frac{1}{2}$

7. $(\log(u))' = g'(u) f'(g(u)) \rightarrow g'(u) = (u^2-1)^{-\frac{1}{2}} = \frac{1}{2\sqrt{u^2-1}} \rightarrow g(\frac{r}{\sqrt{2}}) = \frac{1}{\sqrt{2-1}} = 1 \rightarrow f(u) = (f(u))^2 + 1 = 4u^2 + 1 \rightarrow f'(u) = 4u = f'(1) = 4$ $\rightarrow -1\sqrt{2}(4) = 4(-1\sqrt{2}) \Rightarrow$ برابر 4

8. $g'(u) = f'(u+1) + 3f'(3u+1) \rightarrow g'(2) = f'(-1) + 3f'(7) = \frac{1}{2} + 3(\frac{1}{2}) = 2$ $\rightarrow f'(-1) = \frac{1}{2}$ $\rightarrow f'(-1) = f'(1)$

9. $f(u) = 2 \rightarrow h(u) = f(u-h) - f(u-h-1) = -f'(u) \times \frac{1}{2}$ $f(u) = (1 + \sqrt{u+1}) + (u-1) \rightarrow \frac{1}{2\sqrt{u+1}}$ $f'(u) = 2 + \frac{1}{2\sqrt{u}} = \frac{4\sqrt{u} + 1}{2\sqrt{u}}$

10. $y = \frac{1-rm}{4} \rightarrow y = \frac{m}{4} + \frac{1}{4} \rightarrow m = \frac{1}{4}$ $\rightarrow m' = -2 \rightarrow y = u^2 - 2u + 1 \rightarrow y' = 2u - 2 = m' = -2$ $2u = 2 \rightarrow u = 1 \rightarrow (1, 2)$ $\rightarrow$ در این نقطه عمود بوده است.