1) $P(\xi = k) = \frac{a^k}{(1+a)^{k+1}}$, $a > 0$, $k = 0, 1, \dots$

$$M\xi = \sum_{i=0}^{k} i \cdot \frac{a^i}{(1+a)^{i+1}}$$ //

$$D\xi = M\xi^2 - (M\xi)^2 = \sum_{i=0}^{k} i^2 \cdot \frac{a^{i^2}}{(1+a)^{i^2+1}} - \left(\sum_{i=0}^{k} i \cdot \frac{a^i}{(1+a)^{i+1}}\right)^2$$ //

$$\varphi_\xi(s) = Ms^\xi = \sum_{n=0}^{\infty} \frac{a^n}{(1+a)^{n+1}} \cdot s^n$$ //

2) ξ, $\varphi_\xi(s)$, $M\xi^3$ – ?

$$\varphi_\xi'''(s) = \sum_n n(n-1)(n-2)s^{n-3} p_n \Rightarrow \varphi_\xi'''(1) = \sum_n n(n-1)(n-2) p_n =$$

$$= \sum_n n^3 p_n - 3\sum_n n^2 p_n + 2\sum_n n p_n \overset{def}{=} M\xi^3 - 3M\xi^2 + 2M\xi$$

$$M\xi^3 = \varphi_\xi''' + 3M\xi^2 - 2M\xi = \varphi_\xi''' + 3\varphi_\xi'' + \varphi_\xi'$$ //