11. $M_X(s) = M_{X_1}(s) \cdot M_{X_2}(s) \cdots M_{X_n}(s)$

$= (M_{X_1}(s))^n \qquad = \left(\frac{\lambda}{\lambda - s}\right)^n$

$M_{X_1} = \lambda / (\lambda - s)$ ↗ same

MGF of Gamma(n, λ)

23. $P(Y \geq a) \leq \min_{s>0} \{ e^{-sa} M_X(s) \}$

$M_X(s) = \left(\frac{\lambda}{\lambda - s}\right)^n \quad s < \lambda$

$$\frac{d}{ds} e^{-sa} \left(\frac{\lambda}{\lambda - s}\right)^n = -a e^{-sa} \left(\frac{\lambda}{\lambda - s}\right)^n + n e^{-sa} \left(\frac{\lambda}{\lambda - s}\right)^n \frac{1}{\lambda - s}$$

$$\left(\frac{\lambda}{\lambda - s}\right)^n \left(-a \cancel{e^{-sa}} + n \cancel{e^{-sa}} \frac{1}{\lambda - s}\right)$$

$\therefore S = \lambda - \frac{n}{a}$

$a\lambda - sa = n$

$a = \frac{n}{\lambda - s}$

$$P(Y \geq a) \leq e^{-\lambda a + n} \left(\frac{\lambda a}{n}\right)^n$$

$$e^{-\lambda a + n} \left(\frac{\lambda a}{n}\right)^n = e^{-\lambda a} \left[1 + O\left(\frac{1}{n}\right)\right] \left(\frac{1}{n}\right)^n (\lambda a)^n$$

$$= e^{-\lambda a} \left(\frac{\lambda a}{n}\right)^n + O\left(\frac{1}{n}\right)^{n+1}$$

$\therefore$ goes to 0