$X \sim \Gamma(n,\lambda)$: $\quad F(x) = \int_0^x \frac{\lambda e^{-\lambda y}(\lambda y)^{n-1}}{(n-1)!}\, dy$

$\Gamma(n,\lambda) \sim \sum_{i=1}^{n} X_i \qquad X_i \sim Exp(\lambda)$

$\Rightarrow X = -\frac{1}{\lambda}\sum_{i=1}^{n} \ln U_i = -\frac{1}{\lambda}\ln\left(\prod_{i=1}^{n} U_i\right) \sim \Gamma(n,\lambda)$