STA 347F2003 Formula Sheet 2

If $0 < a < 1$ then $\sum_{k=j}^{\infty} a^k = \frac{a^j}{1-a}$.

$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots = \sum_{k=0}^{\infty} \frac{x^k}{k!}$.

$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$.

Binomial: $X \sim B(n,p)$ means $Pr\{X = k\} = \binom{n}{k} p^k (1-p)^{n-k}$ for $k = 0, , \ldots, n$. Note: $E[X] = np$, $V[X] = np(1-p)$.

Poisson: $X \sim P(\mu)$ means $Pr\{X = k\} = \frac{e^{-\mu}\mu^k}{k!}$ for $k = 0, 1, \ldots$. Note: $E[X] = V[X] = \mu$

Exponential: $X \sim \exp(\lambda)$ means $f_X(x) = \lambda e^{-\lambda x} \mathbf{1}\{x \geq 0\}$. Note $E[X] = 1/\lambda$, and $F_X(x) = (1 - e^{-\lambda x})\mathbf{1}\{x \geq 0\}$.

Gamma: $X \sim G(n, \lambda)$ means $f_X(x) = \frac{\lambda^n}{(n-1)!} e^{-\lambda x} x^{n-1} \mathbf{1}\{x \geq 0\}$. Note $E[X] = \frac{\lambda}{n}$. The sum of n independent exponential random variables is Gamma.