Name: _____ Student Number: _____

Attachment:

You may find the following formulas useful:

Binomial Distribution

$$P(k) = \binom{n}{k} p^k (1-p)^{n-k}$$

Geometric Distribution

$$P(k) = (1-p)^{k-1} p, \quad E\{k\} = 1/p$$

Poisson Distribution

$$P_k(t) = \frac{(\lambda t)^k}{k!} e^{-\lambda t}$$

Exponential Distribution

$$f(t) = \lambda e^{-\lambda t}$$

M/M/1 Queue

$$P_k = \left[\frac{(1-\rho)}{1-\rho^{N+1}}\right]\rho^k, \quad \bar{k} = \frac{\rho}{1-\rho} = \lambda T, \quad \sigma_k^2 = \frac{\rho}{(1-\rho)^2}, \quad \bar{k}_N = \left[\frac{\rho}{1-\rho}\right]\left[1-(N+1)P_N\right]$$

Multiple Server: M/M/m Queue

$$P_k = P_0 (m\rho)^k / k!, \text{ for } k \le m \qquad P_k = P_0 m^m \rho^k / m!, \text{ for } k \ge m$$

Erlang C Formula: $$P_Q = \frac{P_0 (m\rho)^m}{m!(1-\rho)}$$

General Service Distribution: M/G/1 Queue

expected waiting time: $$E\{W\} = \frac{\lambda E\{\tau^2\}}{2(1-\rho)}$$