Formulas Queueing Systems

$M/M/c$ queue:

$$\Pi_W = \frac{(c\rho)^c}{c!}\left((1-\rho)\sum_{n=0}^{c-1}\frac{(c\rho)^n}{n!} + \frac{(c\rho)^c}{c!}\right)^{-1} \qquad \text{with } \rho = \lambda/(c\mu)$$

$M/G/1$ queue:

$$P_{L^d}(z) = \frac{(1-\rho)\widetilde{B}(\lambda-\lambda z)(1-z)}{\widetilde{B}(\lambda-\lambda z)-z}$$

$$\widetilde{W}(s) = \frac{(1-\rho)s}{\lambda\widetilde{B}(s)+s-\lambda}$$

$$\widetilde{S}(s) = \frac{(1-\rho)\widetilde{B}(s)s}{\lambda\widetilde{B}(s)+s-\lambda}$$

$G/M/1$ queue:

$$\sigma = \widetilde{A}(\mu-\mu\sigma)$$

$M/G/c/c$ queue:

$$B(c,\rho) = \frac{\rho^c/c!}{\sum_{n=0}^{c}\rho^n/n!} \qquad \text{with } \rho = \lambda E(B)$$