\[
\begin{align*}
\frac{w}{(1 - w)} &= \delta \\
\left\{ \begin{array}{l}
\sum_{t=1}^{\infty} \frac{1}{(1 - w)^t} \frac{\delta w + w - 1}{\frac{\delta}{\rho} - \frac{w}{\theta} - 1} \\
0 < \rho \end{array} \right. = (1)A
\end{align*}
\]

**12. Cumulative distribution function of response time:**

\[d = (\rho w)/\gamma = (t)A\]

**11. Average utilization of each server:**

\[\frac{d - 1}{(d - \theta + 1)d} = [u]A\]

**10. Variance of number of jobs in the queue:**

\[(d - 1)/\partial d = [b]A\]

**9. Mean number of jobs in the queue:**

\[\frac{2(d - 1)}{\partial d - d + 1} \partial d + \partial w = [u]A\]

**8. Variance of number of jobs in the system:**

\[\frac{d - 1}{\partial d} + \partial w = [u]A\]

**7. Mean number of jobs in the system:**

In the remaining formulas below we will use \(\bar{d}\) as defined here:

\[\frac{d(d - 1)w}{w(\partial w)} = (\text{jobs } w \geq 0)A\]

**6. Probability of queueing:**

\[w \geq u \quad \frac{\frac{u}{w(\partial w)}}{u(w_d)} = u_d\]

\[w > u \quad \frac{\frac{u}{w(\partial w)}}{u(\partial w)}\]

**5. Probability of \(\text{jobs in the system} = u\):**

\[\left[ \frac{u}{w(\partial w)} \sum_{t=1}^{\infty} \frac{1}{(1 - w)^t} \right] + \frac{(d - 1)w}{w(\partial w)} = 0d\]

**4. Probability of zero jobs in the system:**

\[\text{The system is stable if the traffic intensity is less than 1.} \]

\[(\rho w)/\gamma = \bar{d}\]

**3. Traffic intensity:**

\[\frac{n}{w} \text{ number of servers} = w\]

\[\text{service rate in jobs per unit time} = \eta\]

\[\text{arrival rate in jobs per unit time} = \lambda\]

**2. Parameters:**

\[\lambda, w, \eta, n\]

**1. Parameters:**

\[\text{M/M/1 Queue} \]

Box 3.12: M/M/1 Queue
and all the formulas become identical to those for $M/M/1$ queues.

For $\delta = \delta$, $I = w$ in the system: $0.0d \{[(d - 1) w]/\delta \} = \delta$

Once again, in these formulas the probability of $w$ or more jobs

\[
(\partial I / \partial \delta)_{\delta=0} \left[ \frac{\delta}{[\delta]} \right]
\]

90th percentile of the waiting time:

\[
\left( \frac{b - 1}{\delta} \right) \left[ \frac{\delta}{\delta} \right] \max_{\delta > 0} \left( \frac{\delta}{\delta} \right)
\]

Variance of the waiting time: $\text{Var}[I] = \sum_{k=0}^{\infty} \left( \frac{\delta^{k} \rho}{\delta^{k} \rho + 1} \right) \frac{\delta^{i}}{\delta^{i}}$

Mean waiting time: $\text{Mean}[I] = \sum_{k=0}^{\infty} \left( \frac{\delta^{k} \rho}{\delta^{k} \rho + 1} \right) \frac{\delta^{i}}{\delta^{i}}$

Cumulative distribution function of waiting time:

\[
\left[ \frac{\delta^{(d - 1) w}}{(\delta - \gamma) \delta} + 1 \right] \frac{\delta^{i}}{\delta^{i}} = [\gamma]
\]

Variance of the response time:

\[
\left( \frac{(d - 1) w}{\delta} + 1 \right) \frac{\delta^{i}}{\delta^{i}} = [\gamma]
\]

Mean response time: