

NAME**Qmxd1()** – Unfinished work tail distribution function**SYNOPSIS****#include <queue.h>****double Qmxd1(double x, double rho, double *D, long lkm);****DESCRIPTION**

delim \$\$ This function returns the unfinished work tail distribution for $M \sup \{x\}/D/1$ queuing model.

Qmxd1() is a model for the $M \sup \{x\}/D/1$ queuing system with Poisson batch arrivals and deterministic (constant) service time. *Rho* is the load level of the system. Parameter *x* is the amount of unfinished work in the system. Parameter *lkm* is the number of different batch sizes ($1 - lkm$) and parameter **D* is the distribution of these batch size probabilities. The sum of the probabilities has to be exactly 1.

ALGORITHM

$M \sup \{x\}/D/1$ unfinished work tail distribution is calculated using the following recursive algorithm:

$1 - e \sup \{\lambda x\} \sum_{0 \leq k \leq N} \{a_{\sup k \sup N}\{(x-N) \sup k\}\}$, where

$\{a_{\sup 0 \sup (0)}\} = 1 - \rho$

$\{a_{\sup k \sup (0)}\} = 0, \quad 1 \leq k \leq N$

$\{a_{\sup 0 \sup (n)}\} = \sum_{0 \leq k \leq N} \{a_{\sup k \sup (n-1)}\}$

$\{a_{\sup k \sup (n)}\} = -\{1 \text{ over } k\} \sum_{1 \leq i \leq n} \{\beta_{\sup i}\} \{a_{\sup (k-1) \sup (n-i)}\}$ (If $\{\beta_{\sup i}\}$ doesn't exist, the corresponding term is zero.)

$N = \text{floor}(x)$

ERRORS

When ρ is close to 1, **Qmxd1()** may give inaccurate results.

SEE ALSO

COST 224: Performance evaluation and design of multiservice networks