Erratum to: Analysis of transient queues with semidefinite optimization

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Published online: 13 June 2015

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Erratum to: Queueing Syst (2013) 73:195–234 DOI 10.1007/s11134-012-9309-7

We correct Corollary 1 in Osogami and Raymond [1]. In [1], Theorem 1 gives an upper bound on the probability, $\pi_{a,b,\infty}$, that the random walk in one dimension crosses a boundary, b , before crossing a boundary, $-a$. Theorem 1 is used to derive Corollary 1, which gives an upper bound on $\Pr(W(a) \geq y)$, the probability that the maximum waiting time in the first busy period of a GI/GI/1 queue is at least y , given that the initial work that the first job sees in the system is a .

This upper bound in Corollary 1 is derived on the erroneous basis of $\Pr(W(a) \geq y) = \pi_{a,y,\infty}$, which we here correct to $\Pr(W(a) \geq y) = \pi_{a,y-a,\infty}$. For $y > a$, the corrected upper bound on $\Pr(W(a) \geq y)$ is given by replacing y with $y - a$ in the expression of Corollary 1. For $y \leq a$, we have $\Pr(W(a) \geq y) = 1$. Here, we also correct the upper bound on the corresponding expected value, $E[W(a)] = \int_0^\infty \Pr(W(a) \geq y) dy$, by integrating the corrected upper bound on $\Pr(W(a) \geq y)$ for $y > a$ and integrating $\Pr(W(a) \geq y) = 1$ for $y \in [0, a]$. Specifically, the corrected upper bound is given by adding a into the erroneous upper bound in [1]. Equations (2) and (3) involve the same error as Corollary 1 and need to be corrected in the analogous manner.

To summarize, here we correct Corollary 1 in [1] as follows:

The online version of the original article can be found under doi:[10.1007/s11134-012-9309-7](https://doi.org/10.1007/s11134-012-9309-7).

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Corollary 1 Consider the GI/GI/1 queue. Let C_A (respectively, C_S) be the coefficient of variation for the interarrival time (respectively, service time), λ be the arrival rate, and ρ be the load of the system. Let $W(a)$ be the maximum waiting time in the first busy period, given that the initial work that the first job sees in the system is $a > 0$. Let $\xi \equiv (C_A^2 + C_S^2 \rho^2) / (2\lambda(1 - \rho))$ be Kingman's upper bound on the mean waiting time in steady state. Then

$$\Pr(W(a) \geq y) \leq \min \left\{ 1, \left(1 + (y - a) \left(\xi + a + \frac{1 - \rho}{2\lambda} \right)^{-1} \right)^{-2} \right\} \quad (1)$$

and

$$\mathbb{E}[W(a)] \leq \xi + 2a + \frac{1 - \rho}{2\lambda}. \quad (2)$$

Acknowledgement The authors thank the special interest group on queues of the Operations Research Society of Japan for pointing out the error.

References

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