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On some fixed-point problems in branching and queueing

The busy period R in an M/G/1 queue and various quantities associated with branching processes satisfy fixed-point equations of the form $R \stackrel{\mathcal{D}}{=} Q + \sum_1^N R_m$; variants occur for example for the Google page rank algorithm. We present a simple derivation of the asymptotics of the tail of R under a regular variation condition somewhat more general than in the literature, and give a multivariate version applying to multitype branching processes and multiclass queues. Also a fixed-point equation for preemptive queues and its branching connection is briefly discussed.