A LINEAR MODEL OF POPULATION DYNAMICS

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The Malthus process of population growth is reformulated in terms of the probability W(N,t) to find exactly N individuals at time t assuming that both the birth and the death rates are linear functions of the population size. The master equation for W(N,t) is solved exactly. It is shown that W(N,t) strongly deviates from the Poisson distribution and is expressed in terms of Laguerre's polynomials. The asymptotic analysis of the distribution is presented.