HITTING STRAIGHT LINES BY COMPOUND POISSON PROCESS PATHS[†]

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Abstract.   In a recent article Mallows and Nair (1989, *Ann. Inst. Statist. Math.*, **41**, 1–8) determined the probability of intersection $P\{X(t) = \alpha t$ for some $t \geq 0\}$ between a compound Poisson process $\{X(t), t \geq 0\}$ and a straight line through the origin. Using four different approaches (direct probabilistic, via differential equations and via Laplace transforms) we extend their results to obtain the probability of intersection between $\{X(t), t \geq 0\}$ and arbitrary lines. Also, we display a relationship with the theory of Galton-Watson processes. Additional results concern the intersections with two (or more) parallel lines.

Key words and phrases: Compound Poisson processes, intersection with lines, transition probabilities, Laplace transforms, Galton-Watson processes.