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8 hour simulation – multiple runs with different numbers of carts

Expected values -

Arrival: exponential mean 75 seconds
Expected customer count: (8*60*60)/75 ≈ 384 (if enough carts)
  4.06% chance of doing neither aisle (.29*.14 = .0406) ≈ 16
    (No aisle case - exit in 53 seconds normal (dev 15))
  61.06% chance of doing both (.71*.86 = .6106) ≈ 234
  34.88% chance of doing exactly one (.71*.14 + .29*.86) ≈ 38+96=134
   (0.71*0.14*5)+(0.29*0.86*8)+(0.71*0.86*13) = 10.43 items on average
Remark:
  probability of picking 0 on aisle 1 is e^{-5}=0.006737947 (Poisson p(0) = $e^{-\lambda}$)
  probability of picking 0 on aisle 2 is e^{-8}= 0.0003354626
  expected number of aisle shoppers choosing 0 is (234* e^{-5}* e^{-8})+(38* e^{-5})+(96* e^{-8})=0.2888< 1
  effect on number shopping neither aisle is negligible

31.29 = 3*10.43 seconds to check out on average
43.5073189 seconds to pay on average (60 x $\beta(1+1/\alpha)$); α =4, β = .8
74.8 is mean service time

Stability (Grad students):
Interarrival time at server = (8*60*60)/ (384-16) = 78.26
system is stable since service occurs faster than arrivals
Stability enforcers:
    Balk if more than 4 in line
    Don't shop if no carts; renege in 30 seconds