Hw 6.3 Part C pages 405-406 problems 93, 95, + 100

(93) Let X = # of 1's and 2's p = .477 (1 or 2) 1-p = .523 (not 1 or 2)

Need to determine if binomial or geometric

B: ✓ s = 1 or 2 f = not 1 or 2

I: yes, reasonable to assume

N: ✓ n = 90

S: ✓ p = .477 is constant for each trial

∴ Binomial B(90, .477)

so $P(X \leq 29)$ = binomcdf(90, .477, 29) ≈ .002

where n = 90, p = .477 and X = 29

So probability of having 29 or less 1's and 2's is very small, about .2%. Therefore we have reason to suspect invoice amounts are not genuine.

(95) a) Not geometric, it fails T: we are not counting # of trials until 1st success (we are counting until we have all 5)

∴ not geometric

b) B: yes S: Lola wins some money F: Lola doesn't win money

I: yes outcomes of games independent of each other

T: yes counting # of games until she wins 1

S: yes prob of success = .259 is constant for each game

∴ geometric

(96) a) not geometric fails independence because we do not replace previous cards drawn

b) B: ✓ s: hits bull's eye f: does not hit bull's eye
I: ✓ different shots independent of each other
T: ✓ continuing until he gets his 1st bull's eye
S: ✓ p: .10 is constant for all shots
∴ geometric

(97) a) X: # of pulls to start mower
p: .20 1-p: .80 ... geometric
starting not starting
$P(X=3) = (.20)(.80)^2 = .128$ or $P(X=3) = \text{Geompdf}(.20, 3) = .128$
1 success where p: .20 and X: 3
2 failures

b) $P(X > 10) = 1 - P(X \leq 10) = 1 - \text{Geomcdf}(.20, 10) \approx .1074$
X is an infinite amount so use complement

(98) X: # of bottles bought ... geometric
∴ p: 1/6 1-p: 5/6
winning bottle not winning bottle

a) $P(X=5) = (1/6)(5/6)^4 = .0804$ or $P(X=5) = \text{Geompdf}(1/6, 5) = .0804$
1 success where p: 1/6 and X: 5
4 fails

b) $P(X \leq 8) = \text{Geomcdf}(1/6, 8) = .7674$

(99) a) geometric X = # times until wheel lands on 18 $p = 1/38$

$\mu_X = 1/(1/38) = 38$ we would expect it to take 38 games to win if one wins 1 out of 38.

b) $P(X \leq 3) = \text{geomcdf}(1/38, 3) \approx .0769 \approx 7.69\%$

There is about an 8% chance that Marti could win in 3 or less games, although this is not a usual occurrence, it is not unlikely or completely surprising.

(100) X = # of invoices inspected until you find 8 or 9 geometric

$p = .097$ 8 or 9 $1-p = .903$ not 8 or 9

a) $\mu_X = 1/p = 1/.097 \approx 10.31$ we would expect to examine about 10.31 invoices in order to find the 1st 8 or 9.

b) $P(X \geq 40) = 1 - P(X \leq 39) = 1 - \text{geomcdf}(.097, 39) = .0187$

There is about a 2% chance you don't get an 8 OR 9 until 40 or more invoices. This is rare so we may suspect that invoice amounts are not genuine.