HW p. 550

(48) X = number of applicants who need to be interviewed in order to find one who is fluent in Farsi.

X is geometric random variable with $p = .04$

(a) $\mu_X = \frac{1}{p} = \frac{1}{.04} = 25$ The expected number of interviews needed to obtain the first person who speaks Farsi is 25.

(b) $P(X > 25) = (1 - .04)^{25} = (.96)^{25} = 0.3604$

The probability that it will take more than 25 interviews to find someone who speaks Farsi is 36.04%.

$P(X > 40) = (1 - .04)^{40} = (.96)^{40} = 0.1954$

The probability that it will take more than 40 interviews to find someone who speaks Farsi is 19.54%

(49) • We must "assume" there is a success, a missed shot, and a made shot.

(a) • the probability of missing a shot remains the same, $p = .2$, from trial to trial.
• the result of each shot is independent of the next.

(b) $P(X = 6) = (.8)^5(.2) = .0655$ The probability that the first success, missed shot occurs on the 6th shot is 6.55%

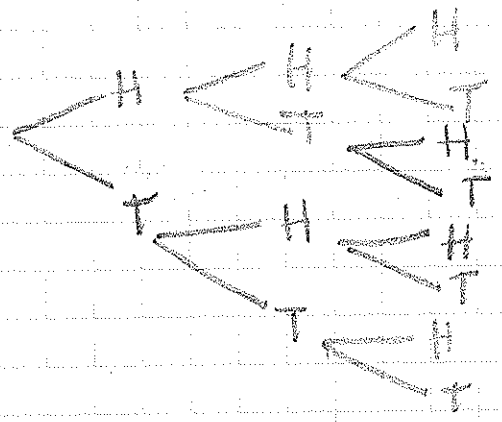
*geompdf(.2, 6)

(c) $P(X \leq 6) = 1 - P(X > 6) = 1 - (.8)^6 = .7379$ the probability that it takes at most 6 shots before the first success, missed shot is 73.79%.

$= (.2) + (.8)(.2) + (.8)^2(.2) + (.8)^3(.2)$
$+ (.8)^4(.2) + (.8)^5(.2)$

geometcdf(.2, 6)

(50)



S: HHH, HHT, HTH, HTT
THH, THT, TTH, TTT

(a) $P(\text{no winner}) = \frac{2}{8} = 0.25$

no winner → all same
HHH TTT

b) S = someone wins on given toss

$P(S) = 1 - 0.25 = 0.75$

(c) X = number of rounds (tosses) until someone wins

- Success is getting a winner, failure is not getting a winner on a trial (each person tossing a coin once).
- Probability of success remains the same from trial to trial, $p = 0.75$
- Result of each toss (round) independent of next toss.
- No set number of trials.

X is a geometric random variable with $p = 0.75$

(d)

X	1	2	3	4	5	6	7
P(X)	0.75	0.1875	0.046875	0.011719	0.00293	.000732	.000183
F(X)	0.75	.9375	.984375	.9961	.99902	.99976	.99994

(e) $P(X \leq 2) = 0.9375$ The probability that it takes at most 2 rounds to get a winner is 93.75%.

(f) $P(X > 4) = (1 - .75)^4 = .0039$

$(.25)(.25)(.25)(.25)$
F F F F

The probability that it will take more than 4 rounds to get a winner is 0.39%.

(g) $\mu_x = \frac{1}{p} = \frac{1}{0.75} = 1.333.$ We can expect, in the long run, for it to take 1.333 rounds before a winner is named.