Math 32 #3

1. We draw two cards from a regular deck of 52. Let S1 be the event “the first one is a spade,” and S2 “the second one is a spade.” Calculate the following probabilities:
   1. P(S1)
      1. P(S1)=(13)/(52)= ¼
      2. There are 13 spades (A,1,2~J,Q, K) out of 52 cards.
   2. P(S2 | S1)
      1. P(S2) ∩ P(S1) / P(S1)
      2. P(S2 | S1)= (12)/(51) = 4/17
      3. P(S2)is 12 because it has to be second one in spade.
      4. The probability is out of 51 because the S2 already used first chance.
   3. P(S2 |S1c)
      1. P(S2) ∩(1- P(S1)) / (1-P(S1))
      2. P(S2 | S1c)=(13)/(51)= 13/51
      3. The probability is out of 51 because S1c shows there was no space on first one.
      4. S2 is 13 because Since the first one is not space, second one should be spade.
2. Let X be a RV with a geometric distribution with success probability p. That is,

P(X = n) = (1-p)^(n-1)p For n ≥ 0, show that P(X > n) = (1 − p)^n.

P(X = n) = p(1-p)^(n-1)

P(X > n)= = = p =

P(X>N)= = (1-p)^n

= p(1-p)^(n)+(1-p)^(n+1)+…….

= P(1-p)^(n)\*(1+(1-p)+(1-p)^2+…….+(1-p)^n)

=(1-p)^n

P(X=n) is probability of first x trials are failure and x+1th trail is success

P(x>n) is probability of you get success after x+1th trail