Assignment 3

Group 25

November 17, 2018

$Sol^n 1:$

P(faulty) = 1/50
Company makes a \$3 profit on the sale of the sale of any making of gadget, but suffers a loss of \$80 for every faulty gadget// E(X) = 49/50 * 3 + 1/50*(-80)
= 147/50 - 80/50
= 67/50
= 1.34

Since the expected value is positive, the company can expect to make a profit. On average, they make a profit of \$ 1.54 per gadget produced.

$Sol^n 2:$

$M_x = 1/2*(1 + e^t)$
Variance of X Var[x] = $M_x^{'} - (M_x^{"})^2)$
$M_x^{'} = 1/2*e^t$
$M^{'}(0) = 1/2$
$M_x^{"} = 1/2*e^t$
M"(0) = 1/2
Var[x] = 1/2 - 1/4
= 1/4

$Sol^n 3:$

This time until the first result appears is $p_1 = 1$. The random time until a second (different) result appears is geometrically distributed with parameters of success $p_2 = 1_{\overline{5/6}}$ then $p_3 = 1_{\overline{4/6}}$, $p_4 = 1_{\overline{3/6}}$ and so on..

E[t] = $\frac{1}{p_1} + \frac{1}{p_2} + \frac{1}{p_3} + \frac{1}{p_4} + \frac{1}{p_5} + \frac{1}{p_6}$
$= \frac{1}{6/6} + \frac{1}{5/6} + \frac{1}{4/6} + \frac{1}{3/6} + \frac{1}{2/6} + \frac{1}{1/6}$
= 14.7

$Sol^n 4:$

P(Q_1) = 0.8
cost = \$100
P(Q_2) = 0.5
cost = \$200

case 1:

E[x] = $P(Q_1) * p(Q_2^c) + P(Q_1) * P(Q_2)$
=0.8*0.5*100 + 0.8*0.5*300
=160

case 2:

E[x] = $P(Q_2) * p(Q_1^c) + P(Q_2) * P(Q_1)$
=0.5*0.2*200 + 0.5*0.8*300
=140

$Sol^n 5:$

The number of tosses is a geometric random variable with parameter
$p^{'}$ = p*(1-q) + (1-p)*q
so the mean is 1$\frac{}{p' Varianceis}$1-p$^{'}\frac{}{p'^2}$
$Sol^n 6:$

card 2-9 - 5 points
card 10 and face cards -¿ 10 points
Ace - 15 points
Total mean = $E[X_1]$ + $E[X_2]$ + $E[X_3]$
= $\frac{8}{13}$*5 + $\frac{4}{13}$*10 + $\frac{1}{13}$*15
= $\frac{95}{13}$

$Sol^n 7:$

There are $\frac{n}{k}$ groups of size k each. X_i random variable that denotes the number of tests performed in group i.
X_i take value 1 with probability $(1-p)^k$ and value k+1 with probability 1-$(1-p)^k$ expected no. of tests is
= n$\frac{}{k*(1-p)^k+(k+1)*(1-(1-p)^k)=n*(1-(1-p)+\frac{1}{k}}$