Assignment 2 part II

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Question 1

1.

Type of Bus	Probability show up
Premium	1/5
Economy	4/5

2. Let X=number of premium bus show up, then n=10.
   So E(x)=nPx=10*0.2=2 premium buses/month

3. Variance(x)=np(1-p)=10*0.2*0.8=1.6≈2 premium buses/month

4. P(x>6)=P(X=6,7,8,9,10)=10C6*0.2^6*0.8^4+10C7*0.2^7*0.8^3+10C8*0.2^8*0.8^2+10C9*0.2^9*0.8+10c10*0.2^10=0.0064

5. Min.=all ten bus are economy=10*1000=10,000
   Max.=all ten bus are premium=10*1500=15,000

6. Let X=money of received

Type of Bus	Number of Bus	Revenue per Type-X	Revenue
Economy	8	1000	8000
Premium	2	1500	3000
			11000

Expected Revenue=1000/ economy*Expected number of economy cars+1500/premium*Expected number of cars=1000*8+1500*2=11000

7. SD(x)=√Var(x)= √[(8000-11000)^2*0.8+(3000-11000)^2*0.2]=√20000000=4472.1

8. 20 scenario: Let X=number of premium bus show up, n=20.
   Then E(x)=nPx=20*0.2=4

   30 scenario: Let X=number of premium bus show up, n=30.
   Then E(x)=nPx=30*0.2=6

9. 20 scenario: Let X=number of premium bus show up, n=20.
   Then Var(x)=np(1-p)=20*0.2*0.8=3.2≈3

   30 scenario: Let X=number of premium bus show up, n=30.
   Then Var(x)=np(1-p)=30*0.2*0.8=6.4≈6

10. 20 scenario: Let X=money of received

Type of Bus	Number of Bus	Revenue per Type-X	Revenue
Economy	16	1000	16000
Premium	4	1500	6000
			22000

E(x)=sum of revenue=16*1000+4*1500=22000

30 scenario: Let X=money of received

Type of Bus	Number of Bus	Revenue per Type-X	Revenue
Economy	24	1000	24000
Premium	6	1500	9000
			33000

E(x)=sum of xPx=24*1000+6*1500=33000

11. 20 scenario:
SD(x)=√Var(x)= √[(16000-22000)^2*0.8+(6000-22000)^2*0.2]=√80000000=8944.3

30 scenario:
SD(x)=√Var(x)= √[(24000-33000)^2*0.8+(9000-33000)^2*0.2]=√180000000=13416.4

12. 20 scenario:
Coefficient of variation(x)=SD(x)/E(x)=8944.3/22000=0.406

30 scenario:
Coefficient of variation(x)=SD(x)/E(x)=13416.4/33000=0.406

Question 2:

a) Plan: chance of numbers of server serve customers during peak hour.
Do: Fourth server at 38000 annual costs:
1.3 customers during peak hours per minutes, each serve a customer in 1.7 minutes.
So time of each server to serve number of customer in peak hours=λ =1.3*1.7=2.21
P(X=0,1,2,3,4)= (e^-2.21*2.21^0)/0!+ (e^-2.21*2.21^1)/1! +(e^-2.21*2.21^2)/2!+ (e^-2.21*2.21^3)/3!+ (e^-2.21*2.21^4)/4!=0.926
Report: so the probability of 4 server can serve customer during peak hours is 92.6%, the probability that they can't serve=1-0.926=0.074=7.4% which is less than 10%.

b) Plan: chance of numbers of server serve customers during peak hour.
Do: Rent a machine at 25000 annual costs:
1.3 customers during peak hours per minutes, each serve a customer reduce to 1.25 minutes.
So time of each server to serve number of customer in peak hours=λ =1.3*1.25=1.625
P(X=0,1,2,3)= (e^-1.625*1.625^0)/0!+ (e^-1.625*1.625^1)/1! +(e^-1.625*1.625^2)/2!+ (e^-1.625*1.625^3)/3!=0.918
Report: so the probability of 4 server can serve customer during peak hours is 91.8%, the probability that they can't serve=1-0.918=0.082=8.2% which is less than 10%.

c) Plan: chance of numbers of server serve customers during peak hour.
Do: Remains the same
1.3 customers during peak hours per minutes, each serve a customer in 1.7 minutes.
So time of each server to serve number of customer in peak hours=λ =1.3*1.7=2.21

P(X=0,1,2,3)= (e^-2.21*2.21^0)/0!+ (e^-2.21*2.21^1)/1! +(e^-2.21*2.21^2)/2!+ (e^-2.21*2.21^3)/3!= 0.817

Report: so the probability of 3 server can serve customer during peak hours is 81.7%, the probability that they can't serve=1-0.817=18.3% which is greater than 10%. So the manager has to change the current structure otherwise those server can't serve much of customer during peak hours.

Conclusion: Under current situation, our store doesn't have the ability to provide fast and good services to our customers as expected. We have to change current position, and methods of either hire a 4th server or rent a new machine improve our efficiency. However, the annual cost for rent a new machine is 13000 cheaper than hire a fourth server annually. So I will rent a new machine.

Personal Ethics Statement
Individual Assignment:

By signing this Statement, I am attesting to the fact that I have reviewed the entirety of my attached work and that I have applied all the appropriate rules of quotation and referencing in use at the Telfer School of Management at the University of Ottawa, as well as adhered to the fraud policies outlined in the Academic Regulations in the University's Undergraduate Studies Calendar.

2.20.2016

Signature Date

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