Passed Solution review

A project faces uncertainty about the number of users of the service to be provided. It might be 10, 20, or 40 with probabilities 0.3, 0.5, and 0.2, respectively. There are two options, A and B. Under option A, the value per user is $10. Under option B, the value per user is $5 with probability 0.4 and otherwise $20. Assume the number of users and the value per user under option A are independent. Option A costs $100 and option B costs $250.

a. Set up the normal form representation.

	1	2	3	Exp Value
Probability	.3	.5	.2	
Quantity	10	20	40	
A: B=$10/ C=$100	=(10*10)-100=0	=(10*20)-100=100	=(10*40)-100=300	=(.3*0)+(.5*100)+(.2*300)=110
.4B: B=$5/ C=$250	=(5*10)-250=-200	=(5*20)-250=-150	=(5*40)-250=-50	=(.3*-200)+(.5*-150)+(.2*-50)=-145
.6B: B=$20/ C=$250	=(20*10)-250=-50	=(20*20)-250=150	=(20*40)-250=550	=(.3*-50)+(.5*150)+(.2*550)=170

b. What are the expected values for each option?

See values in above table

c. What is the value of perfect information before the decision is made?

$170 - (-145) = 170 + 145 = 315$

If $n=10$, A or nothing else if $n=20$ or 40, A if Bv=5, else B

$E(V|Info) = (0 \cdot .3) + (.5)[(.4 \cdot 100) + (.6 \cdot 150)] + (.2)[(.4 \cdot 300) + (.6 \cdot 550)] = 155$

Value ≈ 155 - 110 = 45

d. Suppose the decision maker could, for a price, determine whether value per user would be 5 or 20 under option B, tough you would learn nothing about the number of users. What is the value of that information?

$.4(110 - (-145)) + .6(170-110) = .4(255) + .6(60) = 102 + 36 = 138$

If Bv=5, A   Else $E(V|B) = (.3 \cdot 0) + (5 \cdot 150) + (.2 \cdot 550) = 185$

Value = 185 - 110 = 75