Quiz Decision Analysis

A manufacturer must decide whether or not to extend credit to a retailer who would like to open an account with the company. A review of new accounts in recent years shows that 45% turned out to be high-risk customers, 35% were moderate-risk customers, and 20% were low-risk customers. If credit is extended, the company can expect to make an average of $50,000 with a moderate-risk customer and $100,000 with a low-risk customer. However, extending credit to a high-risk customer will result in an average loss of $60,000. There is no gain or loss of money for the company if credit is not extended.

At a cost of $2,000, the manufacturer can obtain a credit rating report on the retailer prior to making a decision about extending credit. However, the procedure for computing credit ratings is not 100% accurate. In the past, this credit agency has given low-risk customers a satisfactory credit report 10% of the time and an unsatisfactory report 5% of the time, when these customers should have given an excellent report. Moderate-risk customers, who should have been rated as satisfactory, incorrectly received an unsatisfactory credit report 7% of the time and an excellent report 6% of the time. Most of the high-risk customers were correctly given unsatisfactory credit ratings, but 5% received satisfactory reports and 1% received excellent report.

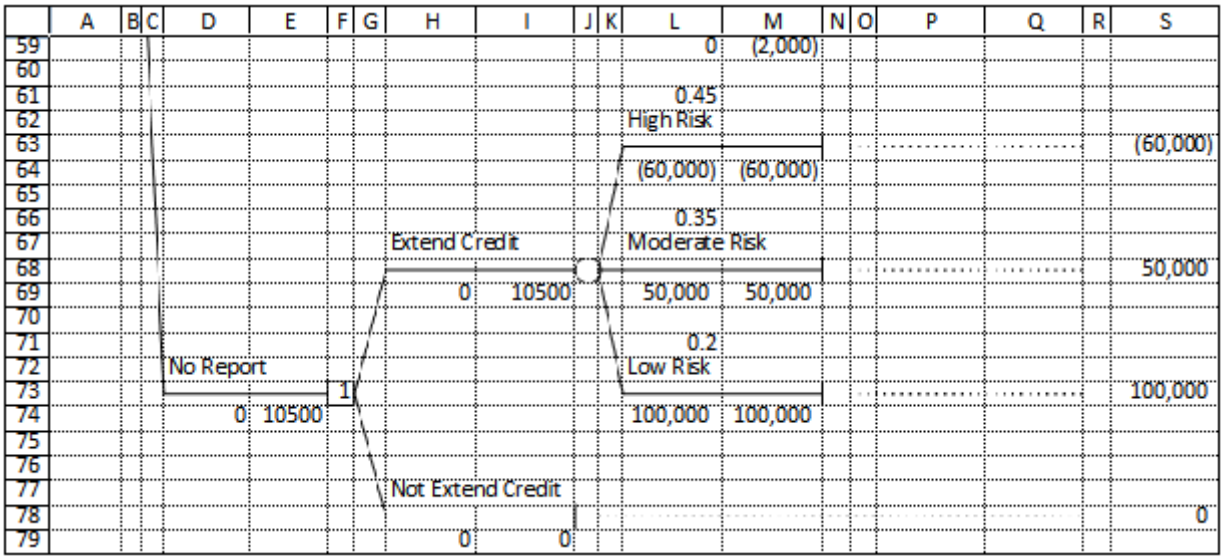
Use the information and the probability rules to complete the following tables first, construct payoff table, and construct a decision tree with the information given, answer before answer questions. You may use Excel@.

	A	B	C	D	E
32		High Risk	Moderate Risk	Low Risk	
33	Prior Probability				
34					
35	Conditional Probability of Rating Given Risk				
36	P(Rating|Risk)	High Risk	Moderate Risk	Low Risk	
37	Excellent Rating				
38	Satisfactory Rating				
39	Not Satisfactory Rating				
40	Sum				
41					
42	Joint Probability of Risk and Rating				
43	P(Risk∩Rating)	High Risk	Moderate Risk	Low Risk	RowSum
44	Excellent Rating				
45	Satisfactory Rating				
46	Not Satisfactory Rating				
47	ColSum				
48					
49	Posterior Probability of Risk Given Rating				
50	P(Col|Row)	High Risk	Moderate Risk	Low Risk	Sum
51	Excellent Rating				
52	Satisfactory Rating				
53	Not Satisfactory Rating				
54					

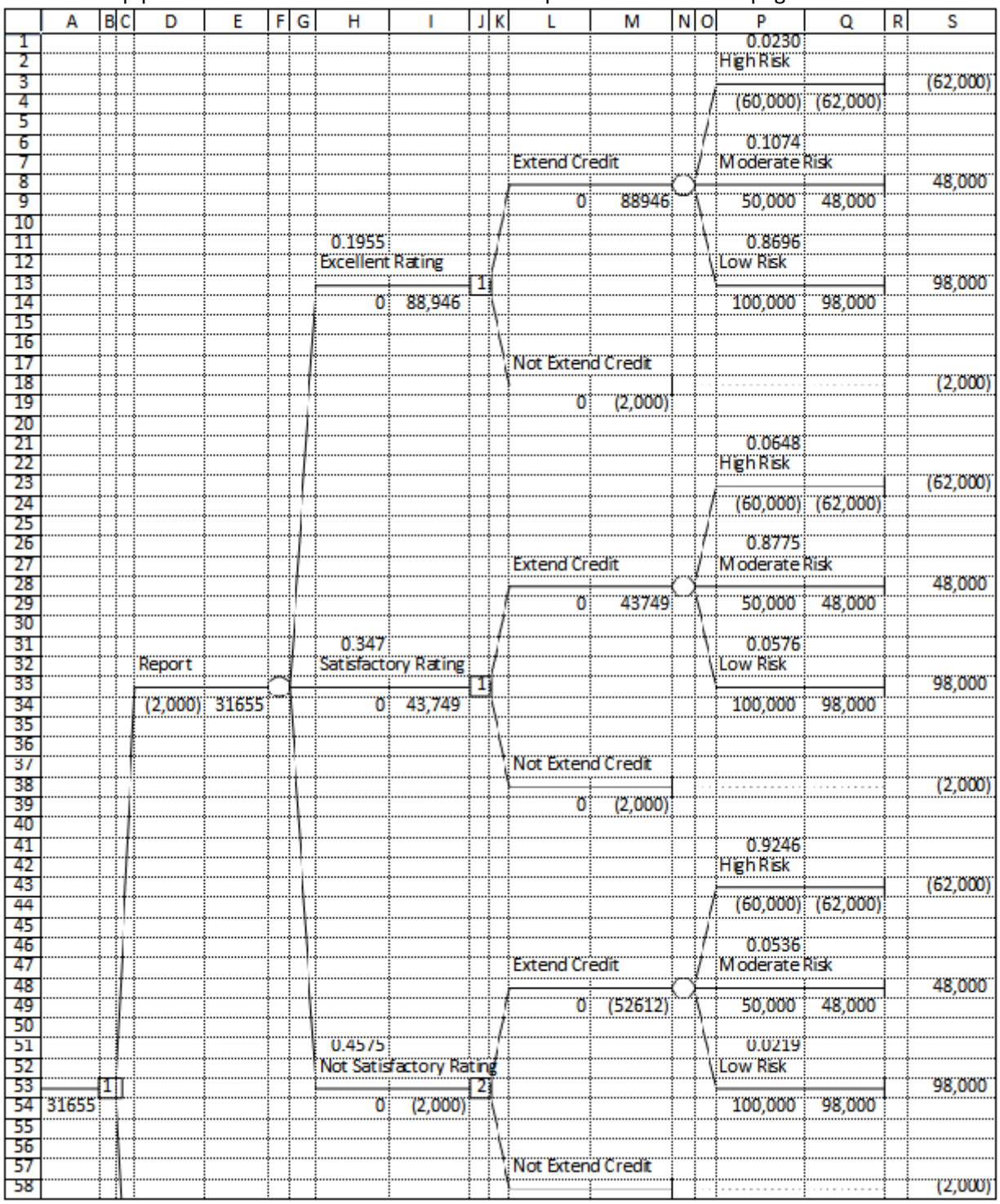
1. What is the probability of a randomly selected retailer to be a high - risk customer?
    a. 0.45
    b. 0.35
    c. 0.023
    d. 0.01
2. Among the high-risk customers, what is the probability of a randomly selected retailer to receive excellent credit rating?
    a. 0.0100
    b. 0.4500
    c. 0.1955
    d. 0.0230
3. What is the probability that a randomly selected retailer is a moderate-risk customer and receives satisfactory rating?
    a. 0.870
    b. 0.305
    c. 0.347
    d. 0.878
4. Among the customers receiving Not Satisfactory Rating, what is the probability that a randomly selected retailer has Low risk?
    a. 0.022
    b. 0.010
    c. 0.050
    d. 0.200
5. What is the maximum EMV? Can you find the Max EMV from the decision tree?
    a. $10,500
    b. $31,655
    c. $33,655
    d. $45,749
6. What is the EMV with Perfect Information (EVwPI)? Can you show how to work out EVwPI?
    a. $37,500
    b. $10,500
    c. $88,946
    d. $27,000
7. What is the EVPI? Can you show how to compute EVPI?
    a. $27,000
    b. $37,500
    c. $10,500
    d. $33,655
8. What is the EVSI? Can you show how to compute EVSI from the decision tree given?
    a. $23,155
    b. $33,655
    c. $21.155
    d. $2,000

9. What is the efficiency of the Sample Information? How do you interpret the efficiency of the Sample information for this case?
    a. 85.8%
    b. 14.2%
    c. 78.4%
    d. None of the others
10. What decision strategy should be used?
    a. Obtain a credit report for a retailer, extend credit if the credit report is either excellent or satisfactory, otherwise do not extend credit
    b. Obtain a credit report for a retailer, extend credit if EVPI is more than EVSI.
    c. Do not obtain credit report, because it costs too much and more than EVSI.
    d. Extend credit without obtaining credit report because the maximum EMV is positive.

This is the bottom portion of the decision tree. The top portion is on the next page.



This is the top portion of the decision tree. The bottom portion is on the last page.



(This quiz is based upon Susan Palocsay Modeling Exercise #3 (Solution in SPalocsayDA.xlsx/ME3))