MGSC660 Group Project 2

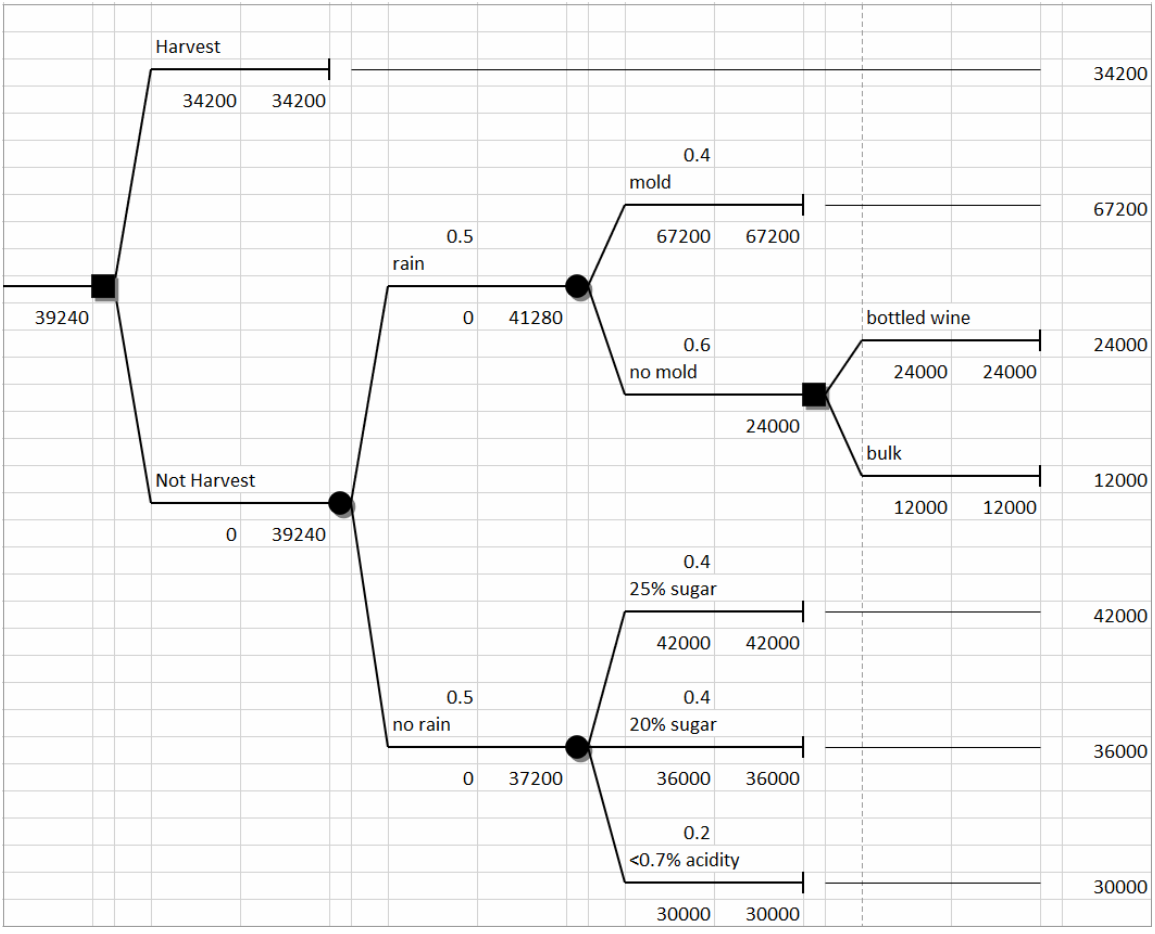
Group Number 8
Anqi Chen 261044081
Yichen Wang 260761601
Jiahua Liang 260711529
Ziye Zhang 260766101

Question 1

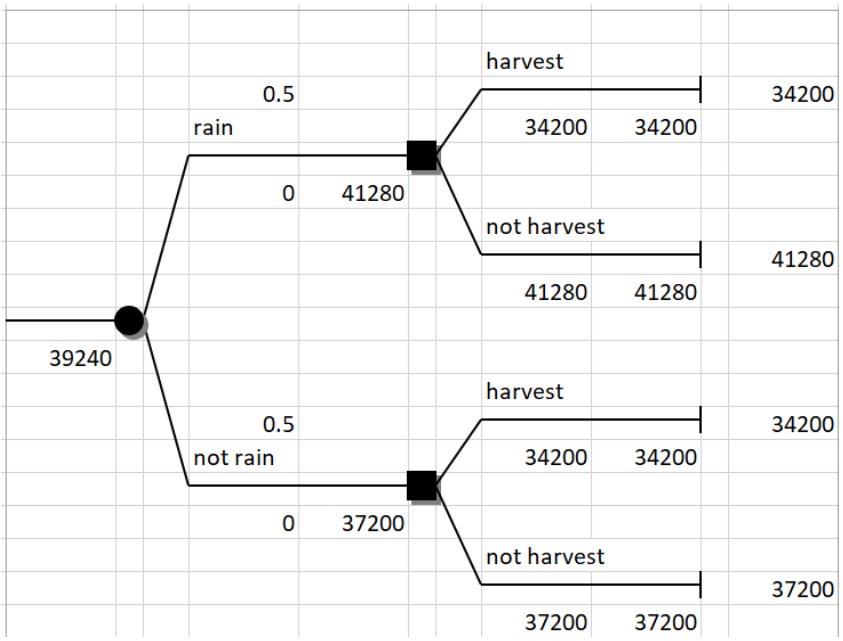
a) The wholesale price will be $2.85 per bottle if Mr. Jaeger chooses to harvest immediately. There are 1000 cases of Riesling with 12 bottles per case, which is 1000*12 = 12000 bottles of Riesling in total. Thus, the total revenue in this case will be $2.85 * 12000 = $34200.

b) If Mr. Jaeger chooses to leave the grapes on the vine, the probability of hitting by rainstorm is 0.5 and the conditional probability of having Botrytis given in rainstorm is 0.4, so the probability of ending up with Botrytis = 0.5*0.4 = 0.2. The wholesale price of Botrytis Riesling is $8.0 per bottle, so the total revenue will be $8.0 * 12000 = $67200.

c) According to the calculation, the EMV of immediate harvest is = $34200 which is less than the EMV of later harvest = $39240 (as suggested by the solution to the tree). Therefore, Mr. Jaeger should not harvest immediately.

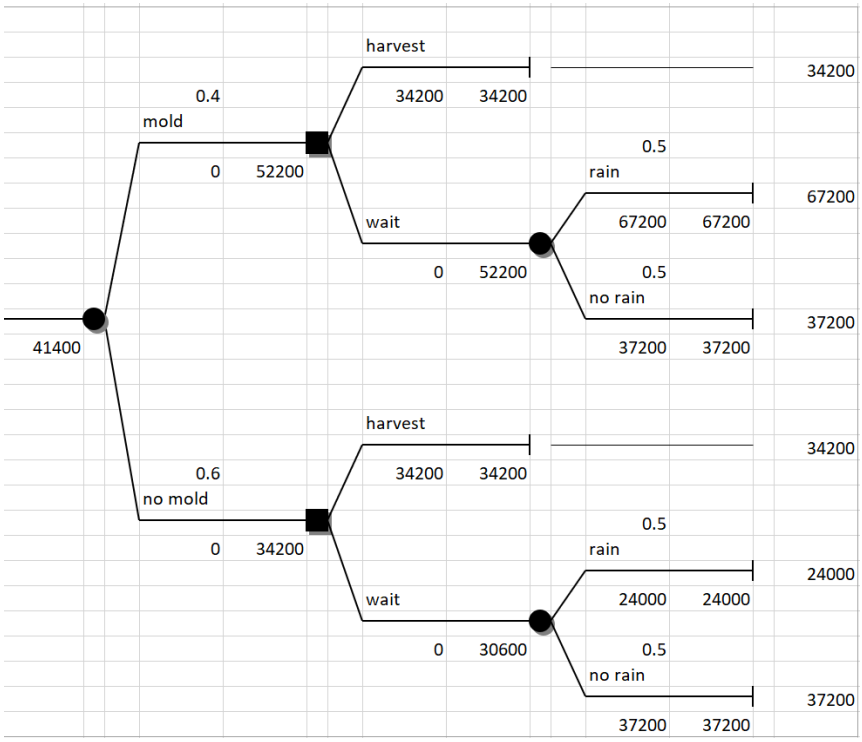


d)



EMV with perfect information of storm is $39240, EMV without information is $39240.
EVPI = EMV(with perfect info) - EMV(without info) = $0

e)



Assumption: *the information about mold event does not eliminate the uncertainty of the rainstorm event.*

E(perfect info) = $41400, EMV (without information) = $39240
EVPI = EMV(with perfect info) - EMV(without info) = $2160
Therefore, Mr. Jaeger is willing to pay 2160 for the information.

Question 2

a) The mean of the revenue of protecting 30 seats is $63831, and the standard deviation of the revenue of protecting 30 seats is $6112.6. The 95% confidence interval for the mean is [$63451.7, $64210.3].

This policy will on average generate a revenue of $63831, with a 95% margin of error of 379.3. An assumption we used was that if the actual discount seats sold were less than 95, and the simulated full fare seats were greater than 30, then the company will sell as many full fare seats as possible, as long as the total seats sold are less or equal to 125. Out of the 1000 simulations, approximately 50% of them were sold more than or equal to 30 full fare ticket seats. This implies that more full fare seats could be protected taking into account that full-fare seats are much more profitable than discount seats. Overall, the policy is reasonable and has relatively high average revenue.

b)

Full-fare protection	Average revenue	Lower Bound	Upper Bound	STD
20	61564	61322.2379	61805.7621	3895.95206
21	61895.6	61645.7093	62145.4907	4026.94387
22	62338	62096.8438	62579.1562	3886.18817
23	62486.2	62209.1887	62763.2113	4463.98664
24	62617.8	62329.4303	62906.1697	4647.02464
25	62870.6	62566.4766	63174.7234	4900.89322
26	63348.6	63042.7233	63654.4767	4929.14744
27	63368.4	63029.0125	63707.7875	5469.16751
28	63513.6	63155.2872	63871.9128	5774.14546
29	64013	63662.971	64363.029	5640.65315
30	63965.4	63581.724	64349.076	6182.86913
31	63625.6	63214.21	64036.99	6629.47468
32	63947.4	63529.6908	64365.1092	6731.30773
33	64086	63650.831	64521.169	7012.67007
34	63701.2	63245.8827	64156.5173	7337.35616
35	63894.6	63408.969	64380.231	7825.85554
36	63810	63325.3892	64294.6108	7809.41528
37	63942.2	63461.2684	64423.1316	7750.12539
38	63207.2	62681.0594	63733.3406	8478.66003
39	63479	62939.0935	64018.9065	8700.49525
40	63441.2	62899.4364	63982.9636	8730.42283

33 is used as the optimal protection level (for this simulation)

This table is values-only.

c) From part b, protecting 33 full fare seats has the optimal revenue. Therefore, we did 1000 simulations of protecting 33 full fare seats, and compared the revenue to the average revenue of protecting 30 seats from part a, which is $63831. The 95% confidence interval is [0.5484, 0.6096]. On average, 95 out of 100 such intervals contain the true probability of optimal revenue greater than or equal to the mean revenue that corresponds to the protection level of 30 seats.