INDR371 - HW3

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Question 1

Part A

Q	Expected Profit
1	-120000
2	-140000
3	-91343.75
4	-30329.38
5	18429.86
6	48952.28
7	62720.00
8	63686.05
9	55939.08
10	42746.77

Table 1: Expected profit table for Q=1,2,..,10

Looking at Table 1, we can infer that optimal quantity to produce is 8 with optimal profit of 63686.05.

Part B

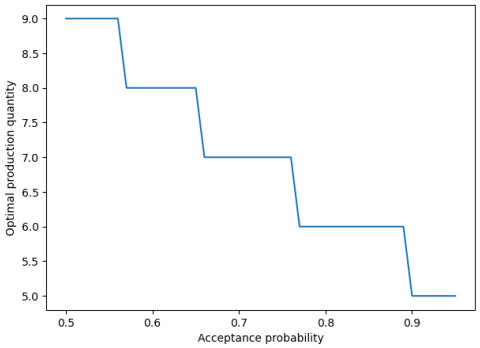

Figure 1: Acceptance probability vs. optimal production quantity

You can see the required plot for this part in Figure 1

Part C

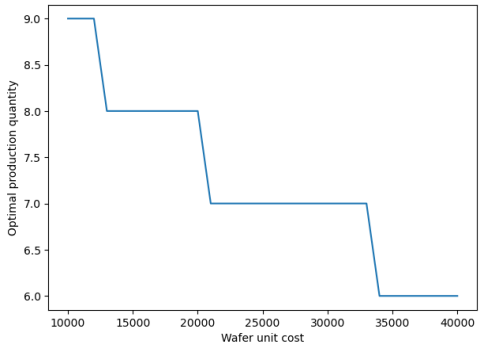

Figure 2: Wafer unit cost vs. optimal production quantity

You can see the required plot for this part in Figure 2

Part D

Q	Expected Profit
1	1.000
2	1.000
3	0.725
4	0.437
5	0.235
6	0.117
7	0.056
8	0.025
9	0.011
10	0.005

Table 2: Probability of losing money for Q=1,2,..,10

In Table 2, you can see the loss probabilities when binomial distribution is used for the expected production quantity.

Part E

Using the given conditional probabilities, when 4 wafer is scheduled, probabilities of production 0, 1, 2, 3 and 4 wafers are as follows: 0.016, 0.048, 0.126, 0.263 and 0.547.

Question 2

Part A

For determining expected profit for a given production quantity, I wrote a function which you can check in my code.

Part B

To find the optimal production quantity, I have tried Q=1,2,...,100 and I have found that optimal production quantity is 41 with the expected profit of 27668.61.

Part C

When acceptance probability is raised to 95%, the optimal production quantity becomes 30 with the expected profit of 53504.82. Considering the results of this part and Part B, the maximum amount that should be paid to such a process improvement is $53504.82 - 27668.61 = 25836.21$