**Appendix (A).** Proofing the concavity of travel agency's profit under the first scenario

To proof the concavity of the travel agency’s profit, condition  should be satisfied where . Thus, firstly, the Hessian matrix should be formed, due to essence of two decision variables, as follows.

|  |  |
| --- | --- |
|  | (A-1) |

Where,

|  |  |
| --- | --- |
|  | (A-2) |
|  | (A-3) |
|  | (A-4) |
|  | (A-5) |
|  | (A-6) |
|  | (A-7) |
|  | (A-8) |
|  | (A-9) |
|  | (A-10) |
|  | (A-11) |
|  | (A-12) |
|  | (A-13) |
|  | (A-14) |
|  | (A-15) |
|  | (A-16) |
|  | (A-17) |
|  | (A-18) |
|  | (A-19) |
|  | (A-20) |
|  | (A-21) |
|  | (A-22) |

So, we have:

|  |  |
| --- | --- |
|  | (A-23) |

Then, it is concluded that  is concave because it is known that  and .

**Appendix (B).** Proofing the concavity of airline's profit under the first scenario

To proof the concavity of the airline’s profit, firstly, the Hessian matrix should be formed, due to essence of two decision variables, as follows.

|  |  |
| --- | --- |
|  | (B-1) |

Where,

|  |  |
| --- | --- |
|  | (B-2) |
|  | (B-3) |
|  | (B-4) |

Then, it is concluded that  is concave if following conditions are satisfied.

|  |  |
| --- | --- |
|  | (B-5) |
|  | (B-6) |

**Appendix (C).** Proofing the concavity of hotel's profit under the first scenario

To proof the concavity of the airline’s profit, firstly, the Hessian matrix should be formed, due to essence of two decision variables, as follows.

|  |  |
| --- | --- |
|  | (C-1) |

Where,

|  |  |
| --- | --- |
|  | (C-2) |
|  | (C-3) |
|  | (C-4) |

Then, it is concluded that  is concave if following conditions are satisfied.

|  |  |
| --- | --- |
|  | (C-5) |
|  | (C-6) |

**Appendix (D).** Obtaining the optimal values of decision variables

The optimal values of  and  are derived by taking the first order derivatives of the objective function, Eq. (76), regarding  and  which are as given:

|  |  |
| --- | --- |
|  | (D-1) |
|  | (D-2) |
|  | (D-3) |
|  | (D-4) |
|  | (D-5) |
|  | (D-6) |

After simplifying the above equations, the bets responses of the agency with respect to the airline and the hotel’s decisions are:

|  |  |
| --- | --- |
|  | (D-7) |
|  | (D-8) |
|  | (D-9) |
|  | (D-10) |
|  | (D-11) |
|  | (D-12) |

According to the assumptions, a Stackelberg game is established between the partners in whom the agency as the follower firstly determines its optimal decisions regarding the leaders’ predetermined policies. Then, the leaders identify their decision variables based on the best responses of the followers. Note that a Nash game is considered between the airline and the hotel which those are determined their decision variables, simultaneously. Then, the optimal values of  and are substituted into Eq. (23) which is equal to:

|  |  |
| --- | --- |
|  | (D-13) |

By taking the first order derivatives of the objective function, Eq. (D-13), regarding  and , the optimal values of  and  are as given:

|  |  |
| --- | --- |
|  | (D-14) |
|  | (D-15) |

Then, the closed form solutions of the airline decision variables are as follow.

|  |  |
| --- | --- |
|  | (D-16) |
|  | (D-17) |

In following, the optimal values of  and are substituted into Eq. (46) which is equal to:

|  |  |
| --- | --- |
|  | (D-18) |

By taking the first order derivatives of the objective function, Eq. (D-18), regarding  and , the optimal values of  and  are as given:

|  |  |
| --- | --- |
|  | (D-19) |
|  | (D-20) |

Hence, the closed form solutions of the hotel’s decision variables are as follow.

|  |  |
| --- | --- |
|  | (D-21) |
|  | (D-22) |

By substituting the above closed form solutions, Eq. (D-16), (D-17), (D-21) and (D-22) into the Eq. (D-7)–(D-12), the closed form solutions of its decision variables are:

|  |  |
| --- | --- |
|  | (D-23) |
|  | (D-24) |
|  | (D-25) |
|  | (D-26) |
|  | (D-27) |
|  | (D-28) |

**Appendix (E).** Proofing the concavity of travel agency's profit under the second scenario

Like the first scenario, if condition  is satisfied where , the concavity of the objective function is proved. Thus, we have:

|  |  |
| --- | --- |
|  | (E-1) |

**Appendix (F).** Proofing the concavity of airline's profit under the second scenario

Similarly,  is concave if following conditions are satisfied.

|  |  |
| --- | --- |
|  | (F-1) |
|  | (F-2) |

**Appendix (G).** Proofing the concavity of hotel's profit under the second scenario

Similarly,  is concave if following conditions are satisfied.

|  |  |
| --- | --- |
|  | (G-1) |
|  | (G-2) |

**Appendix (H).** Obtaining the closed form solutions

The closed form solutions of the decision variables are obtained by using following parameters.

|  |  |
| --- | --- |
|  | (H-1) |
|  | (H-2) |
|  | (H-3) |
|  | (H-4) |
|  | (H-5) |
|  | (H-6) |
|  | (H-7) |
|  | (H-8) |
|  | (H-9) |
|  | (H-10) |
|  | (H-11) |
|  | (H-12) |
|  | (H-13) |
|  | (H-14) |
|  | (H-15) |
|  | (H-16) |
|  | (H-17) |
|  | (H-18) |
|  | (H-19) |
|  | (H-20) |
|  | (H-21) |
|  | (H-22) |
|  | (H-23) |
|  | (H-24) |
|  | (H-25) |
|  | (H-26) |
|  | (H-27) |
|  | (H-28) |
|  | (H-29) |
|  | (H-30) |
|  | (H-31) |
|  | (H-32) |
|  | (H-33) |
|  | (H-34) |
|  | (H-35) |
|  | (H-36) |
|  | (H-37) |
|  | (H-38) |
|  | (H-39) |
|  | (H-40) |
|  | (H-41) |
|  | (H-42) |
|  | (H-43) |
|  | (H-44) |
|  | (H-45) |
|  | (H-46) |
|  | (H-47) |
|  | (H-48) |
|  | (H-49) |
|  | (H-50) |
|  | (H-51) |
|  | (H-52) |
|  | (H-53) |
|  | (H-54) |
|  | (H-55) |
|  | (H-56) |
|  | (H-57) |
|  | (H-58) |
|  | (H-59) |
|  | (H-60) |
|  | (H-61) |
|  | (H-62) |
|  | (H-63) |
|  | (H-64) |
|  | (H-65) |
|  | (H-66) |
|  | (H-67) |
|  | (H-68) |
|  | (H-69) |
|  | (H-70) |
|  | (H-71) |
|  | (H-72) |
|  | (H-73) |
|  | (H-74) |
|  | (H-75) |
|  | (H-76) |
|  | (H-77) |
|  | (H-78) |
|  | (H-79) |
|  | (H-80) |
|  | (H-81) |
|  | (H-82) |
|  | (H-83) |
|  | (H-84) |
|  | (H-85) |
|  | (H-86) |
|  | (H-87) |
|  | (H-88) |
|  | (H-89) |
|  | (H-90) |
|  | (H-91) |
|  | (H-92) |
|  | (H-93) |



**Figure 2-b.** The customers' price sensitivity changes versus the firms' profits

Total Profit of Firms

2

4

6

8

10

12

14

16

18

20

22

Unit Cost Changes of Ticket within Spot Selling Period

0

0.5

1

1.5

2

2.5

10

5

Airline

Hotel

Travel Agency

**Figure 2-d.** The tickets' unit cost changes during  versus the firms' profits



**Figure 2-f.** The customers' service level variety for the tickets versus the firms' profits

****

**Figure 2-a.** The airline's potential market changes versus the firms' profits



**Figure 2-c.** The tickets' unit cost changes during  versus the firms' profits



**Figure 2-e.** The customers' price variety for the tickets versus the firms' profits

**Figure 2.** Diagrams of airline’s key parameters changes versus its profit under the first scenario



**Figure 3-b.** The customers' price sensitivity changes versus the firms' profits



**Figure 3-d.** The rooms' unit cost changes during  versus the firms' profits



**Figure 3-f.** The customers' service level variety for the rooms versus the firms' profits



**Figure 3-a.** The hotel's potential market changes versus the firms' profits



**Figure 3-c.** The rooms' unit cost changes during  versus the firms' profits



**Figure 3-e.** The customers' price variety for the rooms versus the firms' profits

**Figure 3.** Diagrams of hotel’s key parameters changes versus its profit under the first scenario



**Figure 4-b.** The customers' price sensitivity changes versus the firms' profits



**Figure 4-d.** The tickets' unit cost changes during  versus the firms' profits



**Figure 4-f.** The customers' service level variety for the tickets versus the firms' profits

****

**Figure 4-a.** The airline's potential market changes versus the firms' profits



**Figure 4-c.** The tickets' unit cost changes during  versus the firms' profits



**Figure 4-e.** The customers' price variety for the tickets versus the firms' profits

**Figure 4.** Diagrams of airline’s key parameters changes versus its profitunder the second scenario



**Figure 5-b.** The customers' price sensitivity changes versus the firms' profits



**Figure 5-d.** The rooms' unit cost changes during  versus the firms' profits



**Figure 5-f.** The customers' service level variety for the rooms versus the firms' profits



**Figure 5-a.** The hotel's potential market changes versus the firms' profits



**Figure 5-c.** The rooms' unit cost changes during  versus the firms' profits



**Figure 5-e.** The customers' price variety for the rooms versus the firms' profits

**Figure 5.** Diagrams of hotel’s key parameters changes versus its profit under the second scenario



**Figure 6.** The advance booking period changes versus the firms' profits under the first scenario



**Figure 7.** The advance booking period changes versus the firms' profits under the second scenario



**Figure 8-a.** The airline's potential market changes versus the firms' profits under O2O policy



**Figure 8-b.** The hotel's potential market changes versus the firms' profits under O2O policy



**Figure 8-c.** The commission changes versus the firms' profits within advance selling period



**Figure 8-d.** The commission changes versus the firms' profits within advance selling period

0

0.1

0.2

0.3

0.4

0.5

0.6

0.7

Discount Price Changes

0

0.5

1

1.5

2

2.5

3

10

5

Airline

Hotel

Travel Agency

Total Profit of Firms

**Figure 8-e.** The fraction of discount price changes versus the firms' profits

**Figure 8.** Diagrams of O2O key parameters changes versus its profit under the second scenario

Table 3. Results of example with an ADB policy under the first scenario ()

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Partners* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Airline | 35.69 | 39.87 | **43422.95** | - | - | - | - | - | - | - | - | - | - |
| Hotel | - | - | - | 43.78 | 44.45 | **37779.67** | - | - | - | - | - | - | - |
| Travel agency | - | - | - | - | - | - | 55.99 | 61.18 | 62.49 | 64.11 | 99.86 | 106.01 | **248927.70** |

Table 4. Results of example without an ADB policy under the first scenario ()

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Partners* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Airline | - | 39.87 | 24974.81 | - | - | - | - | - | - | - | - | - | - |
| Hotel | - | - | - | - | 44.45 | 20483.19 | - | - | - | - | - | - | - |
| Travel agency | - | - | - | - | - | - | - | 61.18 | - | 64.11 | - | 106.01 | 170701.37 |

Table 5. Results of example with an ADB policy under the second scenario ()

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Partners* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Airline | 32.75 | 36.75 | **49771.65** | - | - | - | - | - | - | - | - | - | - |
| Hotel | - | - | - | 40.78 | 41.27 | **42234.69** | - | - | - | - | - | - | - |
| Travel agency | - | - | - | - | - | - | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | **260693.75** |

Table 6. Results of example without an ADB policy under the second scenario ()

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Partners* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Airline | - | 36.75 | 24876 | - | - | - | - | - | - | - | - | - | - |
| Hotel | - | - | - | - | 41.27 | 20242 | - | - | - | - | - | - | - |
| Travel agency | - | - | - | - | - | - | - | 59.34 | - | 62.34 | - | 103.23 | 122440 |

Table 7. The airline's key parameters changes versus the optimal values of the variables and profits under the first scenario

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *% changes* |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | +0.75 | 73.40 | 77.58 | 250980.35 | 24.06 | 24.74 | 5865.72 | 100.82 | 106.02 | 46.18 | 47.80 | 122.87 | 129.02 | 581755.11 |
| +0.50 | 60.83 | 65.01 | 168046.48 | 30.64 | 31.13 | 15423.79 | 85.88 | 91.07 | 51.61 | 53.24 | 115.20 | 121.35 | 440594.42 |
| +0.25 | 48.26 | 52.44 | 101145.53 | 37.21 | 37.88 | 27686.56 | 70.93 | 76.13 | 57.05 | 58.68 | 107.53 | 113.68 | 329651.95 |
| -0.25 | 23.12 | 27.30 | 15442.40 | 50.35 | 51.02 | 60326.20 | 41.04 | 46.24 | 67.92 | 69.55 | 92.19 | 98.34 | 198421.67 |
| -0.50 | 10.54 | 14.73 | Infeasible | 56.92 | 57.59 | 80703.07 | 26.10 | 31.29 | 73.36 | 74.99 | 84.52 | 90.67 | 178133.87 |
| -0.75 | Infeasible | Infeasible | Infeasible | 63.49 | 64.16 | 103784.63 | 11.15 | 16.35 | 78.80 | 80.42 | 76.85 | 83 | 188064.29 |
|  | +0.75 | 32.04 | 36.37 | 38813.45 | 35.74 | Infeasible | Infeasible | 60.83 | 67.12 | 56.04 | 56.56 | 96.40 | 102.25 | 233684 |
| +0.50 | 33.06 | 37.35 | 42215.79 | 38.30 | Infeasible | Infeasible | 59.23 | 65.16 | 68.09 | 58.99 | 97.45 | 103.40 | 237520.69 |
| +0.25 | 34.25 | 38.50 | 46001.77 | 40.97 | 41.91 | 34706.20 | 57.62 | 63.18 | 60.23 | 61.50 | 98.59 | 104.65 | 242525.84 |
| -0.25 | 37.43 | 41.53 | 55192.02 | 46.76 | 47.88 | 52045.56 | 54.32 | 59.15 | 64.89 | 66.87 | 101.28 | 107.53 | 257060.22 |
| -0.50 | 39.59 | 43.60 | 60961.35 | 50 | 51.55 | 63276.85 | 52.61 | 67.08 | 67.49 | 69.82 | 102.93 | 109.26 | 267431.76 |
| -0.75 | 42.34 | 46.24 | 67910.63 | 53.58 | 55.56 | 76985.17 | 50.84 | 54.59 | 70.37 | 73.04 | 104.89 | 111.28 | 280855.10 |
|  | +0.75 | 35.89 | 39.87 | 41355.46 | 43.69 | 44.45 | 42533.86 | 56.13 | 61.18 | 62.41 | 64.11 | 99.91 | 106.01 | 249123.07 |
| +0.50 | 35.82 | 39.87 | 44331.14 | 43.72 | 44.45 | 42573.88 | 56.08 | 61.18 | 62.44 | 64.11 | 99.89 | 106.01 | 249057.84 |
| +0.25 | 35.76 | 39.87 | 47305.15 | 43.75 | 44.45 | 42613.94 | 56.03 | 61.18 | 62.46 | 64.11 | 99.87 | 106.01 | 248992.71 |
| -0.25 | 35.62 | 39.87 | 53248.19 | 43.81 | 44.45 | 42694.16 | 55.94 | 61.18 | 62.51 | 64.11 | 99.84 | 106.01 | 248862.80 |
| -0.50 | 35.55 | 39.87 | 56217.21 | 43.84 | 44.45 | 42734.32 | 55.89 | 61.18 | 62.53 | 64.11 | 99.82 | 106.01 | 248798 |
| -0.75 | 35.48 | 39.87 | 59184.56 | 43.87 | 44.45 | 42774.51 | 55.85 | 61.18 | 62.56 | 64.11 | 99.81 | 106.01 | 248733.32 |
|  | +0.75 | 35.69 | 40.11 | 39807.04 | 43.78 | 44.34 | 42515.06 | 55.99 | 61.35 | 62.49 | 64.03 | 99.86 | 106.07 | 249143.76 |
| +0.50 | 35.69 | 40.03 | 43299.59 | 43.78 | 44.38 | 42561.33 | 55.99 | 61.29 | 62.49 | 64.06 | 99.86 | 106.05 | 249071.59 |
| +0.25 | 35.69 | 39.95 | 46789.75 | 43.78 | 44.41 | 42607.65 | 55.99 | 61.24 | 62.49 | 64.08 | 99.86 | 106.03 | 248999.57 |
| -0.25 | 35.69 | 39.79 | 53762.86 | 43.78 | 44.48 | 42700.46 | 55.99 | 61.13 | 62.49 | 64.14 | 99.86 | 105.99 | 248855.97 |
| -0.50 | 35.69 | 39.71 | 57245.83 | 43.78 | 44.52 | 42746.93 | 55.99 | 61.07 | 62.49 | 64.17 | 99.86 | 105.97 | 248784.39 |
| -0.75 | 35.69 | 39.63 | 60726.39 | 43.78 | 44.56 | 42793.46 | 55.99 | 61.02 | 62.49 | 64.20 | 99.86 | 105.95 | 248712.95 |
|  | +0.75 | 32.34 | 36.28 | 58169.25 | 45.27 | 46.04 | 46777.23 | 53.70 | 58.74 | 63.65 | 65.36 | 99.02 | 105.12 | 242822.01 |
| +0.50 | 33.23 | 37.24 | 55501.31 | 44.87 | 45.62 | 45662.09 | 54.31 | 59.39 | 63.34 | 65.03 | 99.24 | 105.35 | 244392.97 |
| +0.25 | 34.32 | 38.41 | 52866.57 | 44.38 | 45.10 | 44314.52 | 55.05 | 6019 | 62.96 | 64.62 | 99.52 | 105.65 | 246369.41 |
| -0.25 | 37.45 | 41.76 | 47753.75 | 42.99 | 43.61 | 40558.55 | 57.19 | 62.47 | 61.87 | 63.46 | 100.30 | 106.48 | 252361.20 |
| -0.50 | 39.80 | 44.28 | 45328.04 | 41.94 | 42.48 | 37834.31 | 58.80 | 64.20 | 61.05 | 62.58 | 100.89 | 107.12 | 257194.07 |
| -0.75 | 43.12 | 47.83 | 43059.41 | 40.47 | 40.90 | 34156.17 | 61.06 | 66.62 | 59.90 | 61.34 | 101.72 | 108 | 264455.70 |
|  | +0.75 | 35.08 | 39.26 | 48363.22 | 44.05 | 44.72 | 43365.86 | 55.57 | 60.77 | 62.70 | 64.32 | 99.71 | 105.86 | 7813.08 |
| +0.50 | 35.28 | 39.46 | 48996.89 | 43.96 | 44.63 | 43127.95 | 55.71 | 60.91 | 62.63 | 64.25 | 99.76 | 105.91 | 248182.73 |
| +0.25 | 35.48 | 39.67 | 49634.98 | 43.87 | 44.54 | 42890.67 | 55.85 | 61.05 | 62.56 | 64.18 | 99.81 | 105.96 | 248554.27 |
| -0.25 | 35.89 | 40.07 | 50924.45 | 43.69 | 44.36 | 42418.02 | 56.13 | 61.32 | 62.41 | 64.04 | 99.91 | 106.06 | 249303.02 |
| -0.50 | 36.09 | 40.27 | 51575.82 | 43.60 | 44.27 | 42182.64 | 56.26 | 61.46 | 62.34 | 63.97 | 99.96 | 106.11 | 249680.24 |
| -0.75 | 36.30 | 40.48 | 52231.62 | 43.51 | 44.18 | 41947.90 | 56.40 | 61.60 | 62.27 | 63.90 | 100.01 | 106.16 | 250059.34 |

Table 8. The hotel's key parameters changes versus the optimal values of the variables and profits under the first scenario

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *% changes* |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | +0.75 | 17.72 | 21.90 | 8579 | 83.59 | 84.26 | 235687.51 | 40.38 | 45.58 | 107.53 | 109.15 | 124.13 | 130.29 | 599063.41 |
| +0.50 | 23.71 | 27.89 | 20191.58 | 70.32 | 70.99 | 154308.22 | 45.58 | 50.78 | 92.51 | 94.14 | 116.04 | 122.19 | 451768.49 |
| +0.25 | 29.70 | 33.88 | 34091.08 | 57.05 | 57.72 | 89963.73 | 50.79 | 55.98 | 77.50 | 79.13 | 107.95 | 114.10 | 335056.59 |
| -0.25 | 41.68 | 45.86 | 68750.85 | 30.51 | 31.18 | 12379.13 | 61.19 | 66.39 | 47.47 | 49.10 | 91.77 | 97.92 | 193381.83 |
| -0.50 | 47.66 | 51.85 | 89511.12 | 17.24 | 17.91 | Infeasible | 66.39 | 71.59 | 32.46 | 34.09 | 83.68 | 89.83 | 168418.98 |
| -0.75 | 53.65 | 57.83 | Infeasible | 3.96 | 4.64 | Infeasible | 71.59 | 76.79 | 17.44 | 19.07 | 75.58 | 81.74 | Infeasible |
|  | +0.75 | 27.03 | 30.73 | 34017.44 | 39.81 | 40.97 | 39317.20 | 48.70 | 53.49 | 68.08 | 70.26 | 96.14 | 102.34 | 261120.41 |
| +0.50 | 29.80 | 33.67 | 38781.55 | 40.93 | 41.96 | 40197.20 | 51.03 | 55.97 | 66.24 | 68.23 | 97.27 | 103.48 | 256493.64 |
| +0.25 | 32.68 | 36.71 | 44151.84 | 42.24 | 43.10 | 41292.42 | 53.45 | 58.53 | 64.37 | 66.18 | 98.51 | 104.69 | 252427.15 |
| -0.25 | 38.87 | 43.18 | 57372.43 | 45.62 | 46.06 | 44350.49 | 58.67 | 63.97 | 60.56 | 62.01 | 101.37 | 107.47 | 246044.95 |
| -0.50 | 42.28 | 46.69 | 65754.11 | 47.86 | 48.02 | 46475.27 | 61.55 | 66.93 | 58.59 | 59.87 | 103.08 | 109.11 | 243897.90 |
| -0.75 | 46.01 | 50.47 | 75913.98 | 50.64 | Infeasible | Infeasible | 64.69 | 70.12 | 56.56 | 57.67 | 105.08 | 110.99 | 242723.25 |
|  | +0.75 | 35.54 | 39.87 | 50055.97 | 44.16 | 44.45 | 24771 | 55.87 | 61.18 | 62.74 | 64.11 | 99.96 | 106.01 | 249327.32 |
| +0.50 | 35.59 | 39.87 | 50129.72 | 44.03 | 44.45 | 30739.07 | 55.91 | 61.18 | 62.65 | 64.11 | 99.93 | 106.01 | 249193.77 |
| +0.25 | 35.64 | 39.87 | 50203.56 | 43.91 | 44.45 | 36700.08 | 55.95 | 61.18 | 62.57 | 64.11 | 99.89 | 106.01 | 249060.56 |
| -0.25 | 35.74 | 39.87 | 50351.54 | 43.65 | 44.45 | 48600.92 | 56.03 | 61.18 | 62.40 | 64.11 | 99.82 | 106.01 | 248795.18 |
| -0.50 | 35.79 | 39.87 | 50425.67 | 43.52 | 44.45 | 54540.75 | 56.07 | 61.18 | 62.32 | 64.11 | 99.79 | 106.01 | 248663.01 |
| -0.75 | 35.83 | 39.87 | 50499.90 | 43.39 | 44.45 | 60473.51 | 56.11 | 61.18 | 62.23 | 64.11 | 99.75 | 106.01 | 248531.19 |
|  | +0.75 | 35.69 | 39.71 | 50035.37 | 43.78 | 44.88 | 24127.32 | 55.99 | 61.05 | 62.49 | 64.39 | 99.86 | 106.13 | 249362.72 |
| +0.50 | 35.69 | 39.76 | 50115.96 | 43.78 | 44.73 | 30311.61 | 55.99 | 61.09 | 62.49 | 64.30 | 99.86 | 106.09 | 249217.29 |
| +0.25 | 35.69 | 39.81 | 50196.67 | 43.78 | 44.59 | 36487.18 | 55.99 | 61.14 | 62.49 | 64.21 | 99.86 | 106.05 | 249072.29 |
| -0.25 | 35.69 | 39.92 | 50358.45 | 43.78 | 44.31 | 48812.17 | 55.99 | 61.23 | 62.49 | 64.02 | 99.86 | 105.97 | 248783.53 |
| -0.50 | 35.69 | 39.98 | 50439.51 | 43.78 | 44.16 | 54961.58 | 55.99 | 61.27 | 62.49 | 63.93 | 99.86 | 105.94 | 248639.79 |
| -0.75 | 35.69 | 40.03 | 50520.70 | 43.78 | 44.02 | 61102.29 | 55.99 | 61.32 | 62.49 | 63.83 | 99.86 | 105.90 | 248496.46 |
|  | +0.75 | 36.95 | 41.02 | 53962.61 | 40.46 | 41.43 | 49738.77 | 57.02 | 62.13 | 60.32 | 62.14 | 98.97 | 105.20 | 242647.84 |
| +0.50 | 36.62 | 40.72 | 52988.66 | 41.32 | 42.22 | 47317.91 | 56.75 | 61.88 | 60.89 | 62.66 | 99.20 | 105.42 | 244247.88 |
| +0.25 | 36.21 | 40.35 | 51789.62 | 42.40 | 43.20 | 44948.81 | 56.42 | 61.57 | 61.59 | 63.30 | 99.49 | 105.68 | 246275.85 |
| -0.25 | 34.99 | 39.24 | 48311.92 | 45.59 | 46.10 | 40471.40 | 55.42 | 60.67 | 63.67 | 65.19 | 100.34 | 106.45 | 252538.85 |
| -0.50 | 34.04 | 38.37 | 45654.47 | 48.10 | 48.38 | 38469.56 | 54.64 | 59.96 | 65.30 | 66.67 | 101.01 | 107.06 | 257732.88 |
| -0.75 | 32.63 | 37.09 | 41866.51 | 51.79 | 51.74 | 36787.05 | 53.48 | 58.91 | 67.71 | 68.86 | 102 | 107.96 | 265808.18 |
|  | +0.75 | 35.93 | 40.11 | 51013.83 | 43.14 | 43.81 | 40855.51 | 56.19 | 61.38 | 62.07 | 63.69 | 99.69 | 105.84 | 247623.12 |
| +0.50 | 35.85 | 40.03 | 50767.85 | 43.35 | 44.02 | 41450.33 | 56.12 | 61.32 | 62.21 | 63.83 | 99.74 | 105.90 | 248056.08 |
| +0.25 | 35.77 | 39.95 | 50522.41 | 43.56 | 44.23 | 42049.84 | 56.05 | 61.25 | 62.35 | 63.97 | 99.80 | 105.96 | 248490.94 |
| -0.25 | 35.61 | 39.79 | 50033.12 | 43.99 | 44.66 | 43262.91 | 55.92 | 61.12 | 62.62 | 64.25 | 99.92 | 106.07 | 249366.37 |
| -0.50 | 35.52 | 39.71 | 49789.28 | 44.20 | 44.88 | 43876.47 | 55.85 | 61.05 | 62.76 | 64.39 | 99.97 | 106.13 | 249806.93 |
| -0.75 | 35.44 | 39.62 | 49545.97 | 44.42 | 45.09 | 44494.71 | 55.79 | 60.98 | 62.90 | 64.53 | 100.03 | 106.18 | 250249.40 |

Table 9. The advance selling period changes versus the optimal values of the decision variables and the profits under the first scenario

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *Parameter values* |  | |  | |  | |
| *Value* | *% Changes* | *Value* | *% Changes* | *Value* | *Changes* |
|  | 0 | 24974.81 | 0 | 20483.19 | 0 | 170701.37 | 0 |
| 0.10 | 50015.21 | +1.00 | 41303.91 | +1.01 | 242934.60 | +0.42 |
| 0.20 | 50080.78 | +1.00 | 41641.44 | +1.03 | 244321.87 | +0.43 |
| 0.30 | 50146.35 | +1.00 | 41978.97 | +1.04 | 245931.15 | +0.44 |
| 0.40 | 50211.93 | +1.01 | 42316.50 | +1.06 | 247429.43 | +0.44 |
| 0.50 | 50277.50 | +1.01 | 42654.03 | +1.08 | 248927.70 | +0.45 |
| 0.60 | 50343.08 | +1.01 | 42991.56 | +1.09 | 250425.98 | +0.46 |
| 0.70 | 50408.65 | +1.01 | 43329.09 | +1.11 | 251924.25 | +0.47 |
| 0.80 | 50474.22 | +1.02 | 43666.62 | +1.13 | 253422.53 | +0.48 |
| 0.90 | 50539.80 | +1.02 | 44004.15 | +1.14 | 254920.80 | +0.49 |

Table 10. The airline's key parameters changes versus the optimal values of the variables and profits under the second scenario

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *% changes* |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | +0.75 | 69.79 | 73.79 | 251589.62 | 20.38 | 20.87 | 2976.33 | 98.68 | 103.77 | 44.13 | 45.65 | 119.65 | 125.64 | 610617.85 |
| +0.50 | 57.44 | 61.44 | 168234.21 | 27.18 | 27.67 | 13545.04 | 83.87 | 88.96 | 49.69 | 51.22 | 112.18 | 118.17 | 463977.59 |
| +0.25 | 45.09 | 49.09 | 100961.56 | 33.98 | 34.47 | 26540.16 | 69.06 | 74.15 | 55.26 | 56.78 | 104.71 | 110.70 | 347336.22 |
| -0.25 | 20.40 | 24.40 | 14664.51 | 47.58 | 48.07 | 60537.63 | 39.44 | 44.53 | 66.39 | 67.91 | 89.77 | 95.76 | 204050.17 |
| -0.50 | 8.05 | 1209 | Infeasible | 54.38 | 54.87 | 81448.98 | 24.62 | 29.71 | 71.95 | 73.47 | 82.30 | 88.29 | 177405.49 |
| -0.75 | Infeasible | Infeasible | Infeasible | 61.18 | 61.67 | 104968.74 | 9.81 | 14.90 | 77.51 | 79.04 | 74.83 | 80.83 | 180759.69 |
|  | +0.75 | 29.83 | 34.04 | 39269 | 33.22 | 32.36 | 22235.10 | 59.08 | 65.27 | 54.73 | 55.18 | 94.20 | 99.92 | 242471.18 |
| +0.50 | 3.65 | 34.80 | 42404.03 | 35.65 | 35.25 | 27955.35 | 57.49 | 63.31 | 56.69 | 57.50 | 95.13 | 100.95 | 247313.39 |
| +0.25 | 31.61 | 35.69 | 45873.93 | 38.17 | 38.21 | 34576.73 | 55.88 | 61.33 | 58.71 | 59.88 | 96.14 | 102.05 | 253315.84 |
| -0.25 | 34.13 | 38.03 | 54228.10 | 43.54 | 44.46 | 51126.31 | 52.59 | 57.32 | 63.05 | 64.92 | 98.47 | 104.54 | 269759.31 |
| -0.50 | 35.84 | 39.62 | 59433.49 | 46.49 | 47.83 | 61549.55 | 50.90 | 55.26 | 65.43 | 67.63 | 99.86 | 105.99 | 280982.95 |
| -0.75 | 38.01 | 41.64 | 65675.22 | 49.71 | 51.45 | 73976.77 | 49.15 | 53.16 | 68.03 | 70.55 | 101.49 | 107.67 | 295107.50 |
|  | +0.75 | 32.95 | 36.75 | 40429.19 | 40.69 | 41.27 | 42111.26 | 54.39 | 59.34 | 60.75 | 62.34 | 97.29 | 103.23 | 260937.04 |
| +0.50 | 32.88 | 36.75 | 43545.06 | 40.72 | 41.27 | 42152.37 | 54.34 | 59.34 | 60.77 | 62.34 | 67.27 | 103.23 | 260855.82 |
| +0.25 | 32.81 | 36.75 | 46659.21 | 40.75 | 41.27 | 42193.51 | 54.29 | 59.34 | 60.80 | 62.34 | 97.26 | 103.23 | 260774.73 |
| -0.25 | 32.68 | 36.75 | 52882.38 | 40.82 | 41.27 | 42275.91 | 54.20 | 59.34 | 60.84 | 62.34 | 97.22 | 103.23 | 260612.90 |
| -0.50 | 32.61 | 36.75 | 55991.40 | 40.85 | 41.27 | 42317.15 | 54.16 | 59.34 | 60.87 | 62.34 | 97.21 | 103.23 | 260532.16 |
| -0.75 | 32.55 | 36.75 | 59098.71 | 40.88 | 41.27 | 42358.44 | 54.11 | 59.34 | 60.89 | 62.34 | 97.19 | 103.23 | 260451.54 |
|  | +0.75 | 32.75 | 36.99 | 38765.65 | 40.78 | 41.16 | 42091.54 | 54.25 | 59.50 | 60.82 | 62.26 | 97.24 | 103.29 | 260929.89 |
| +0.50 | 32.75 | 36.91 | 42436.78 | 40.78 | 41.20 | 42139.21 | 54.25 | 59.45 | 60.82 | 62.29 | 97.24 | 103.27 | 260851.03 |
| +0.25 | 32.75 | 36.83 | 46105.45 | 40.78 | 41.23 | 42186.92 | 54.25 | 59.39 | 60.82 | 63.32 | 97.24 | 103.25 | 260772.32 |
| -0.25 | 32.75 | 36.67 | 53435.39 | 40.78 | 41.31 | 42282.51 | 54.25 | 59.28 | 60.82 | 62.37 | 97.24 | 103.21 | 260615.33 |
| -0.50 | 32.75 | 36.59 | 57096.66 | 40.78 | 41.34 | 42330.38 | 54.25 | 59.23 | 60.82 | 62.40 | 97.24 | 103.19 | 260537.05 |
| -0.75 | 32.75 | 36.51 | 60755.47 | 40.78 | 41.38 | 42378.30 | 54.25 | 59.17 | 60.82 | 62.43 | 97.24 | 103.17 | 260.458.91 |
|  | +0.75 | 28.43 | 32.13 | 53782.46 | 42.75 | 43.38 | 47771.06 | 51.30 | 56.18 | 62.35 | 63.98 | 96.18 | 102.10 | 251481.41 |
| +0.50 | 29.58 | 33.36 | 52380.61 | 42.23 | 42.82 | 46270.61 | 52.08 | 57.02 | 61.95 | 63.55 | 96.46 | 102.40 | 253834.61 |
| +0.25 | 30.98 | 34.86 | 51036.35 | 41.59 | 42.13 | 44460.39 | 53.04 | 58.05 | 61.45 | 63.01 | 96.81 | 102.77 | 256812.46 |
| -0.25 | 35.03 | 39.18 | 48621.30 | 39.74 | 40.16 | 39434.55 | 55.81 | 61 | 60.01 | 61.48 | 97.80 | 103.83 | 265941.01 |
| -0.50 | 38.09 | 42.46 | 47643.78 | 38.35 | 38.67 | 35810.78 | 57.90 | 63.24 | 58.92 | 60.32 | 98.55 | 104.63 | 273419.58 |
| -0.75 | 42.41 | 47.08 | 46945.74 | 36.38 | 36.56 | 30954.03 | 60.85 | 66.40 | 57.39 | 58.68 | 99.61 | 105.77 | 248401.18 |
|  | +0.75 | 32.14 | 36.14 | 47846.21 | 41.06 | 41.55 | 42966.72 | 53.84 | 58.92 | 61.04 | 62.56 | 97.09 | 103.08 | 259385.60 |
| +0.50 | 32.34 | 36.34 | 48483.59 | 40.97 | 41.45 | 42722.08 | 53.97 | 59.06 | 60.96 | 62.49 | 97.14 | 103.13 | 259819.69 |
| +0.25 | 32.55 | 36.55 | 49125.41 | 40.88 | 41.36 | 42478.07 | 54.11 | 59.20 | 60.89 | 62.42 | 97.19 | 103.18 | 260255.74 |
| -0.25 | 32.95 | 36.95 | 50422.33 | 40.69 | 41.18 | 41991.94 | 54.39 | 59.48 | 60.75 | 62.27 | 97.29 | 103.28 | 261133.73 |
| -0.50 | 33.15 | 37.15 | 51077.44 | 40.60 | 41.09 | 41749.81 | 54.52 | 59.61 | 60.68 | 62.20 | 97.34 | 103.33 | 261575.67 |
| -0.75 | 33.35 | 37.35 | 51736.97 | 40.51 | 41 | 41508.31 | 54.66 | 59.75 | 60.61 | 62.13 | 97.39 | 103.38 | 262019.57 |

Table 11. The hotel's key parameters changes versus the optimal values of the variables and profits under the second scenario

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *% changes* |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | +0.75 | 14.07 | 18.07 | 5857.18 | 79.87 | 80.36 | 236940.70 | 38.22 | 43.31 | 105.46 | 106.98 | 120.88 | 126.87 | 630813.60 |
| +0.50 | 20.29 | 24.29 | 18297.14 | 66.84 | 67.33 | 154928.89 | 43.56 | 48.65 | 90.58 | 92.10 | 113 | 118.99 | 47693.53 |
| +0.25 | 26.52 | 30.52 | 32935.29 | 53.81 | 54.30 | 90026.89 | 48.91 | 53.99 | 75.70 | 77.22 | 105.12 | 111.11 | 353564.24 |
| -0.25 | 38.97 | 42.97 | 68806.22 | 27.76 | 28.24 | 11552.31 | 59.59 | 64.68 | 45.94 | 47.47 | 89.36 | 95.35 | 198326.05 |
| -0.50 | 45.20 | 49.20 | 90038.98 | 14.73 | 15.21 | Infeasible | 64.93 | 70.02 | 31.06 | 32.59 | 81.48 | 87.47 | 166461.15 |
| -0.75 | 51.43 | 55.43 | 113469.95 | 1.70 | 2.18 | Infeasible | 70.28 | 75.37 | 16.18 | 17.71 | 73.60 | 79.60 | 165099.04 |
|  | +0.75 | 24.54 | 28.08 | 33421.02 | 37.53 | 38.55 | 39162.93 | 47.32 | 52.02 | 66.40 | 68.48 | 93.93 | 99.99 | 266783.43 |
| +0.50 | 27.18 | 30.89 | 38314.01 | 38.46 | 39.32 | 39963.11 | 49.55 | 54.39 | 64.56 | 66.45 | 94.95 | 101 | 264037.15 |
| +0.25 | 29.91 | 33.77 | 43725.23 | 39.53 | 40.22 | 40970.09 | 51.85 | 56.83 | 62.70 | 64.41 | 96.05 | 102.08 | 261996.28 |
| -0.25 | 35.72 | 39.83 | 56619.35 | 42.29 | 42.53 | 43825.76 | 56.76 | 61.95 | 58.91 | 60.26 | 98.56 | 104.49 | 260214.36 |
| -0.50 | 38.87 | 43.07 | 64511.97 | 44.11 | 44.05 | 45838.86 | 59.43 | 64.69 | 56.95 | 58.13 | 100.04 | 105.89 | 260725.32 |
| -0.75 | 42.27 | 46.52 | 73821.52 | 43.36 | 45.94 | 48410.43 | 62.31 | 67.60 | 54.95 | 55.96 | 101.74 | 107.47 | 262531.06 |
|  | +0.75 | 32.60 | 36.75 | 49544.95 | 41.17 | 41.27 | 23599.51 | 54.13 | 59.34 | 61.07 | 62.34 | 97.34 | 103.23 | 291195.07 |
| +0.50 | 32.65 | 36.75 | 49620.43 | 41.04 | 41.27 | 29818.47 | 54.17 | 59.34 | 60.99 | 62.34 | 97.31 | 103.23 | 261027.58 |
| +0.25 | 32.70 | 36.75 | 49695.99 | 40.91 | 41.27 | 36030.20 | 54.21 | 59.34 | 60.90 | 62.34 | 97.27 | 103.23 | 260860.48 |
| -0.25 | 32.80 | 36.75 | 49847.41 | 40.66 | 41.27 | 48431.95 | 54.29 | 59.34 | 60.74 | 62.34 | 97.21 | 103.23 | 260527.42 |
| -0.50 | 32.85 | 36.75 | 49923.26 | 40.53 | 41.27 | 54621.98 | 54.33 | 59.34 | 60.56 | 62.34 | 97.17 | 103.23 | 260361.46 |
| -0.75 | 32.90 | 36.75 | 49999.21 | 40.40 | 41.27 | 60804.78 | 54.37 | 59.34 | 60.57 | 62.34 | 97.14 | 103.23 | 260195.89 |
|  | +0.75 | 32.75 | 36.58 | 49523.81 | 40.78 | 41.70 | 22820.50 | 54.25 | 59.20 | 60.82 | 62.62 | 97.24 | 103.34 | 261166.40 |
| +0.50 | 32.75 | 36.64 | 49606.31 | 40.78 | 41.55 | 29300.82 | 54.25 | 59.25 | 60.82 | 62.53 | 97.24 | 103.31 | 261008.44 |
| +0.25 | 32.75 | 36.69 | 49688.92 | 40.78 | 41.41 | 35772.22 | 54.25 | 59.29 | 60.82 | 62.44 | 97.24 | 103.27 | 260850.89 |
| -0.25 | 32.75 | 36.80 | 49854.50 | 40.78 | 41.13 | 48688.23 | 54.25 | 59.38 | 60.82 | 62.25 | 97.24 | 103.20 | 260537.03 |
| -0.50 | 32.75 | 36.86 | 49937.47 | 40.78 | 40.99 | 55132.84 | 54.25 | 59.43 | 60.82 | 62.16 | 97.24 | 103.16 | 260380.73 |
| -0.75 | 32.75 | 36.91 | 50020.55 | 40.78 | 40.58 | 61568.52 | 54.25 | 59.47 | 60.82 | 62.07 | 97.24 | 103.12 | 260224.84 |
|  | +0.75 | 34.42 | 38.33 | 54767.05 | 36.52 | 37.24 | 45834.46 | 55.61 | 60.63 | 58.04 | 59.72 | 96.12 | 102.17 | 251027.77 |
| +0.50 | 33.99 | 37.92 | 53445.29 | 37.63 | 38.29 | 44538.79 | 55.26 | 60.29 | 58.76 | 60.40 | 96.41 | 102.45 | 253473.90 |
| +0.25 | 33.44 | 37.40 | 51819.48 | 39.01 | 39.60 | 43326.54 | 54.81 | 59.87 | 59.67 | 61.25 | 96.78 | 102.79 | 256590.91 |
| -0.25 | 31.83 | 35.88 | 47114.38 | 43.13 | 43.48 | 41325.74 | 53.50 | 58.63 | 62.35 | 63.79 | 97.86 | 103.81 | 266327.30 |
| -0.50 | 30.55 | 34.67 | 43531.47 | 46.37 | 46.55 | 40714.17 | 52.46 | 57.65 | 64.47 | 65.79 | 98.71 | 104.62 | 274518.23 |
| -0.75 | 28.67 | 32.89 | 38447.84 | 51.17 | Infeasible | Infeasible | 50.93 | 56.20 | 67.60 | 68.75 | 99.97 | 105.81 | 287441.88 |
|  | +0.75 | 33 | 37 | 50525.12 | 40.15 | 40.63 | 40418.13 | 54.45 | 59.54 | 60.41 | 61.93 | 97.07 | 103.07 | 259163.93 |
| +0.50 | 32.91 | 36.91 | 50273.44 | 40.36 | 40.58 | 41018.96 | 54.38 | 59.47 | 60.54 | 62.07 | 97.13 | 103.12 | 259671.87 |
| +0.25 | 32.83 | 36.83 | 50022.28 | 40.57 | 41.06 | 41624.48 | 54.32 | 59.41 | 60.68 | 62.21 | 97.18 | 103.18 | 260181.81 |
| -0.25 | 32.66 | 36.66 | 49521.55 | 41 | 41.48 | 42849.60 | 54.18 | 59.27 | 60.96 | 62.48 | 97.30 | 103.29 | 261207.69 |
| -0.50 | 32.58 | 36.58 | 49271.97 | 41.21 | 41.70 | 43469.19 | 54.11 | 59.20 | 61.10 | 62.62 | 97.35 | 103.34 | 261723.63 |
| -0.75 | 32.50 | 36.50 | 49022.92 | 41.42 | 41.91 | 44093.48 | 54.04 | 59.13 | 61.24 | 62.76 | 97.41 | 103.40 | 262241.57 |

Table 12. The advance selling period changes versus the optimal values of the decision variables and the profits under the second scenario

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *Parameter values* |  | |  | |  | |
| *Value* | *% Changes* | *Value* | *% Changes* | *Value* | *Changes* |
|  | 0 | 24876 | 0 | 20242 | 0 | 122440 | 0 |
| 0.10 | 49753.15 | +1.00 | 40840.98 | +1.01 | 248074.76 | +1.02 |
| 0.20 | 49757.77 | +1.00 | 41189.41 | +1.03 | 251229.51 | +1.05 |
| 0.30 | 49762.40 | +1.00 | 41537.84 | +1.05 | 254384.26 | +1.07 |
| 0.40 | 49767.03 | +1.00 | 41886.26 | +1.06 | 257539 | +1.10 |
| 0.50 | 49771.65 | +1.00 | 42234.69 | +1.08 | 260693.75 | +1.12 |
| 0.60 | 49776.28 | +1.00 | 42583.12 | +1.10 | 263848.50 | +1.15 |
| 0.70 | 49780.91 | +1.00 | 42931.55 | +1.12 | 267003.25 | +1.18 |
| 0.80 | 49785.54 | +1.00 | 43279.98 | +1.13 | 270158 | +1.20 |
| 0.90 | 49790.16 | +1.00 | 43628.40 | +1.15 | 273312.75 | +1.23 |

Table 13. O2O parameters changes versus the optimal values of the variables and profits under the second scenario

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Parameter* | *% changes* |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | +0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 270395.20 |
| +0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 267161.39 |
| +0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 263927.57 |
| -0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 257459.94 |
| -0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 254226.12 |
| -0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 250992.30 |
|  | +0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 270395.20 |
| +0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 267161.39 |
| +0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 263927.57 |
| -0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 257459.94 |
| -0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 254226.12 |
| -0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 250992.30 |
|  | +0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 256562.11 |
| +0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 257939.33 |
| +0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 259316.54 |
| -0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 262070.97 |
| -0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 263448.18 |
| -0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 264825.39 |
|  | +0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 257693.75 |
| +0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 258693.75 |
| +0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 259693.75 |
| -0.25 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 261693.75 |
| -0.50 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 262693.75 |
| -0.75 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 263693.75 |
|  | 0.1 | 35.24 | 39.39 | 50272.41 | 43.32 | 43.96 | 42665.37 | 55.72 | 60.90 | 62.23 | 63.84 | 99.46 | 105.59 | 92018.28 |
| 0.2 | 34.77 | 38.89 | 50238.83 | 42.84 | 43.45 | 42647.91 | 55.44 | 60.61 | 61.96 | 63.56 | 99.04 | 105.14 | 135442.40 |
| 0.3 | 34.30 | 38.39 | 50177.27 | 42.36 | 42.95 | 42600.98 | 55.17 | 60.31 | 61.70 | 63.28 | 98.62 | 104.70 | 172387.61 |
| 0.4 | 33.86 | 37.92 | 50093.10 | 41.91 | 42.47 | 42529.46 | 54.90 | 60.03 | 61.45 | 63.01 | 98.23 | 104.28 | 203159.89 |
| 0.5 | 33.45 | 37.49 | 49993.28 | 41.50 | 42.03 | 42440.28 | 54.66 | 59.78 | 61.22 | 62.77 | 97.86 | 103.89 | 228012.86 |
| 0.6 | 33.08 | 37.10 | 49884.36 | 41.12 | 41.63 | 42340.17 | 54.44 | 59.55 | 61.01 | 62.54 | 97.54 | 103.55 | 247142.49 |
| 0.7 | 32.75 | 36.75 | 49771.65 | 40.78 | 41.27 | 42234.69 | 54.25 | 59.34 | 60.82 | 62.34 | 97.24 | 103.23 | 260693.75 |
| 0.8 | 32.45 | 36.43 | 49659.07 | 40.48 | 40.95 | 42128.02 | 54.07 | 59.15 | 60.65 | 62.17 | 96.98 | 102.95 | 268770.94 |
| 0.9 | 32.89 | 36.15 | 49549.26 | 40.22 | 40.67 | 42023.05 | 53.92 | 58.99 | 60.50 | 62.01 | 96.74 | 102.70 | 271447.63 |
| 1 | 31.95 | 35.90 | 49443.92 | 39.98 | 40.41 | 41921.68 | 53.78 | 58.84 | 60.37 | 61.87 | 96.53 | 102.48 | 268774.95 |