

**Problem Chosen**

**A**

**2025  
MCM/ICM  
Summary Sheet**

**Team Control Number**

**0000000**

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## **Enjoy a Cozy and Green Bath**

### **Summary**

A traditional bathtub cannot be reheated by itself, so users have to add hot water from time to time. Our goal is to establish a model of the temperature of bath water in space and time. Then we are expected to propose an optimal strategy for users to keep the temperature even and close to initial temperature and decrease water consumption.

To simplify modeling process, we firstly assume there is no person in the bathtub. We regard the whole bathtub as a thermodynamic system and introduce heat transfer formulas.

**In Question 1,** To simplify modeling process, we firstly assume there is no person in the bathtub. We regard the whole bathtub as a thermodynamic system and introduce heat transfer formulas.

**In Question 2,**

**In Question 3,**

**Keywords:** Heat transfer, Thermodynamic system, CFD, Energy conservation

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## **1 Introduction**

### **1.1 Background**

### **1.2 Restatement of the Problem**

- 1.
- 2.
- 3.
- 4.
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### **1.3 Our Work**

## **2**

### **2.1**

### **2.2**

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## References

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# Appendices

## Appendix A First appendix

In addition, your report must include a letter to the Chief Financial Officer (CFO) of the Goodgrant Foundation, Mr. Alpha Chiang, that describes the optimal investment strategy, your modeling approach and major results, and a brief discussion of your proposed concept of a return-on-investment (ROI). This letter should be no more than two pages in length.

Here are simulation programmes we used in our model as follow (**Liu02**).

### Input matlab source:

```

1 function [t,seat,aisle]=OI6Sim(n,target,seated)
2 pab=rand(1,n);
3 for i=1:n
4     if pab(i)<0.4
5         aisleTime(i)=0;
6     else
7         aisleTime(i)=trirnd(3.2,7.1,38.7);
8     end
9 end

```

## Appendix B Second appendix

some more text **Input C++ source:**

```

1 //////////////////////////////////////////////////////////////////
2 // Name      : Sudoku.cpp
3 // Author    : wzlf11
4 // Version   : a.0
5 // Copyright : Your copyright notice
6 // Description : Sudoku in C++.
7 //////////////////////////////////////////////////////////////////
8
9 #include <iostream>
10 #include <cstdlib>
11 #include <ctime>
12
13 using namespace std;
14
15 int table[9][9];
16
17 int main() {
18
19     for(int i = 0; i < 9; i++){
20         table[0][i] = i + 1;
21     }
22
23     srand((unsigned int)time(NULL));
24
25     shuffle((int *)&table[0], 9);
26
27     while(!put_line(1))

```

```
28 {  
29     shuffle((int *)&table[0], 9);  
30 }  
31  
32 for(int x = 0; x < 9; x++){  
33     for(int y = 0; y < 9; y++){  
34         cout << table[x][y] << " ";  
35     }  
36     cout << endl;  
37 }  
38  
39 return 0;  
40 }  
41 }
```

# **Report on Use of AI**

1. OpenAI ChatGPT (Nov 5, 2023 version, ChatGPT-4,)

**Query1:** <insert the exact wording you input into the AI tool>

**Output:** <insert the complete output from the AI tool>

2. OpenAI Ernie (Nov 5, 2023 version, Ernie 4.0)

**Query1:** <insert the exact wording of any subsequent input into the AI tool>

**Output:** <insert the complete output from the second query>

3. Github CoPilot (Feb 3, 2024 version)

**Query1:** <insert the exact wording you input into the AI tool>

**Output:** <insert the complete output from the AI tool>

4. Google Bard (Feb 2, 2024 version)

**Query1:** <insert the exact wording of your query>

**Output:** <insert the complete output from the AI tool>