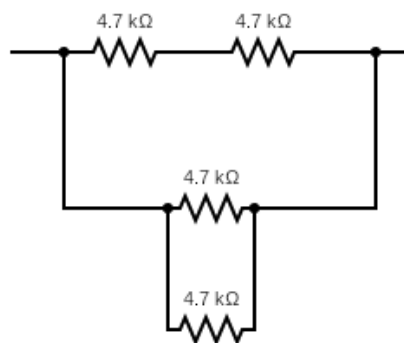


## Task 3

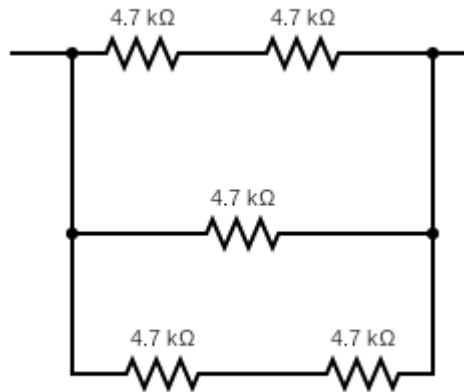
Aspect	Data
Announcement Date	May 8 <sup>th</sup>
Due Date	May 14 <sup>th</sup>
Marks assigned	30
C++ topics practiced	String processing, Input / Output, Loops / Conditions, Modular programming – Functions

### Task description

- Calculating the total resistance of a circuit is the first step in analyzing any circuit.
- Finding the total resistance enables us to calculate the current flowing through the circuit.
- In the last task (task 2) you wrote a program to calculate the value of the total resistance.
- Previously the user was able to choose the type of connection by typing **S** for series and **P** for parallel followed by the values of the values of as many resistances as he wants separated by one space followed by an **E** at the end, and only one type of connection was allowed (all resistances are either connected in series or parallel).
- Well, in most circuits there are usually mixed types of connection.
- In this task we will upgrade our Circuit Analyzer so that the user can describe mixed types of connections.
- For example, the user input: **P S 4.7 4.7 e 4.7 4.7 E** describes the following circuit.



- While the user input: *P S 4.7 4.7 e 4.7 S 4.7 4.7 e E* describes the following circuit.



- After choosing the type of connection the user will insert the values of as many resistances as he wants separated by one space.
- If the user has a different connection type, he will describe the type of connection **S** or **P** followed by the resistances and then **e**.
- The user will end the description of the whole circuit with an **E**.
- If the user inserts another value for the connection the program will show a warning message “**Wrong Circuit Description**”.
- We will assume that the user might get the circuit connection wrong, but he will never forget the **e** separating different connections of the **E** at the end.
- The resistances could take any value.
- The user will also provide the value of the voltage applied to the circuit and the program will calculate the current flowing through it.
- The user will provide the circuit description in **one string** as he did in task 1.
- Your code **must be** modular and should have user defined functions to calculate the total resistance for different kind of connections (function to calculate the resistance in case of series connections and another for parallel connections).
- Hints:

- Refer to task 1 if you don't remember how to calculate the total resistance in each case.
- You can use vectors **if needed**.
- The function `substr()` returns a string and can't be compared to a char but can be compared to a string (even if this string consists of 1 character).
- The function `strtok()` can be used to split a string into tokens which are sequences of characters separated by any of the characters that are part of delimiters.

```
#define _CRT_SECURE_NO_WARNINGS //To use strtok instead of strtok_s
#include <iostream>
#include <string.h>
```

```
using namespace std;
```

```
int main()
```

```

{
    // Given string str
    char str[] = "It, is my, day";

    // Tokenized the first string
    char* ptr = strtok(str, " ,");

    // Print current tokenized string
    cout << ptr << endl;

    // While ptr is not NULL
    while (ptr != NULL) {
        // Tokenize the string
        ptr = strtok(NULL, " ,");

        // Print the string
        cout << ptr << endl;
    }
    return 0;
}

○ To get the length of a string, use the length() function:
string txt = "ABCDEFGHJKLMNOPQRSTUVWXYZ";
int x = txt.length();
cout << "The length of the txt string is: " << x;

```

### Test cases

1. **Circuit description:** *S 1.5 P S 12.85 3.6 e 5 6.6 e 7 E*  
**Voltage applied:** 3.8
2. **Circuit description:** *S L 2.5 5.2 e 4.7 8 E*  
**Voltage applied:** 9
3. **Circuit description:** *P S 4.7 4.7 e 4.7 S 4.7 4.7 e E*  
**Voltage applied:** 7
4. **Circuit description:** *P S 4.7 4.7 e 4.7 4.7 E*  
**Voltage applied:** 9
5. **Circuit description:** *Z S 8.2 3.1 e 1.3 7.8 E*  
**Voltage applied:** 5
6. **Circuit description:** *P S 8.2 3.1 e S 1.3 7.8 e E*  
**Voltage applied:** 5

*Data in italic are user input values.*

### Grading rubric

• The circuit description is recorded in one string.	1 Mark
• The program can process the connection type and all resistance values.	1 Marks
• The program can process mixed connection types correctly.	10 Marks
• The program uses user defined functions to calculate the total resistance in both cases.	10 Marks
• The program calculates the total resistance for the circuit correctly.	1 Marks



• A flow chart for the code.	5 Marks
• The program shows the error message when connection type is wrong	1 Mark
• The program can calculate the circuit current.	1 Marks

### Submission procedure

<ul style="list-style-type: none"> <li>Upload a copy of your code in one pdf file along with screenshots of the previous test cases and a flow chart of your code.</li> </ul>
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### General Instructions

Topic	Rule / Guideline
<b>Assistance of the teaching team</b>	<ul style="list-style-type: none"> <li>- Get access to team from MS Teams – channel of “Capstone Project”, any communication out of this channel will be neglected.</li> <li>- TAs will not respond to any question regarding the project out of this channel.</li> <li>- TAs will have announced time to be available for live communication – they will also reply offline to questions in their live time</li> </ul>
<b>Submission</b>	<ul style="list-style-type: none"> <li>- No accepted submission after the task due time</li> <li>- All submission should be in the portal.</li> <li>- Plagiarism is prohibited and a plagiarized submission will result in a zero and a first strike.</li> <li>- Two plagiarized submissions will result in failure in the whole project.</li> </ul>