

# CSE-016 PROGRAMMING LAB ASSIGNMENT № 2

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*Document structure is detailed in the second page.*

***Solutions begin from the third page.***

## 1 Problems

### 1.1 Problem (1)

John is responsible for planting the street with trees; he can give you the length of the street in meters, the distance between each two trees in a meter, and the cost of planting each tree in dollars. Write a program that should read this information and then print the number of trees needed and the total cost.

### 1.2 Problem (2)

Write a program that calculates the squares, cubes, square root, and exponent ( $e^x$ ) of the numbers from 0 to 5 and uses tabs to print the following table of values:

Number	Square	Cube	Root	Exponent
0	0	0	0.0	1.0
..	..	..	..	..
..	..	..	..	..

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## 2 Solutions

### 2.1 Solution to Problem (1)

#### 2.1.1 Source Code

---

Program's main.c File – console input/output-oriented application to solve the problem

---

```
1  #include <math.h>
2  #include <stdio.h>
3
4  int main() {
5      // Runtime variable declarations
6      float streetlen, treedist, treecost, totalcost;
7      int treenum;
8
9      // Input prompts
10     printf("Hello, John! Let's help you fill the street with trees.\n\n");
11     printf("Please enter the length of the street (m): ");
12     scanf("%f", &streetlen);
13     printf("Now enter the distance you want between each tree (m): ");
14     scanf("%f", &treedist);
15     printf("Great! Finally, enter the cost of planting one tree ($): ");
16     scanf("%f", &treecost);
17     printf("\n"); // To separate input from results
18
19     // Calculations
20     treenum = 1 + floor(streetlen / treedist);
21     totalcost = (float) treecost * treenum;
22
23     // Outputting the results
24     printf("You will have to plant %d tree(s)\n", treenum);
25     printf("The total price you'll pay will be $%.2f\n", totalcost);
26
27     return 0;
28 }
```

---

## 2.1.2 Outcome

### Test Input Samples

#	Street Length	Distance Btn. Trees	Cost/ Tree
(1)	100	10	12
(2)	987	10	13.98

	#	Number of Trees	Total Cost
<b>Obtained Results</b>	(1)	11	132.00
	(2)	99	1384.02

The obtained results match the expected results.

### Console Output

---

Program's output to console in plaintext – using inputs from test sample (1)

---

Hello, John! Let's help you fill the street with trees.

Please enter the length of the street (m): 100

Now enter the distance you want between each tree (m): 10

Great! Finally, enter the cost of planting one tree (\$): 12

You will have to plant 11 tree(s)

The total price you'll pay will be \$132.00

---

*Turn over the page for the solution to problem (2)*

## 2.2 Solution to Problem (2)

### 2.2.1 Source Code

Program's main.c File – console application to output the full table as described in the problem

```
1  #include <math.h>
2  #include <stdio.h>
3
4  int main() {
5      printf("Number\tSquare\tCube\tRoot\tExponent\n");
6      printf("0\t%d\t%d\t%.1f\t%.1f\n", ((int)pow(0,2)), ((int)pow(0,3)), sqrt(0),
          exp(0));
7      printf("1\t%d\t%d\t%.1f\t%.1f\n", ((int)pow(1,2)), ((int)pow(1,3)), sqrt(1),
          exp(1));
8      printf("2\t%d\t%d\t%.1f\t%.1f\n", ((int)pow(2,2)), ((int)pow(2,3)), sqrt(2),
          exp(2));
9      printf("3\t%d\t%d\t%.1f\t%.1f\n", ((int)pow(3,2)), ((int)pow(3,3)), sqrt(3),
          exp(3));
10     printf("4\t%d\t%d\t%.1f\t%.1f\n", ((int)pow(4,2)), ((int)pow(4,3)), sqrt(4),
          exp(4));
11     printf("5\t%d\t%d\t%.1f\t%.1f\n", ((int)pow(5,2)), ((int)pow(5,3)), sqrt(5),
          exp(5));
12     return 0;
13 }
```

*Please note that the line numbers are purely for readability purposes and are not part of the code.*

*Please also note that on lines where there is no new line number, there is **NO** actual line break in the code and that this is meant to be read as one single line.*

### 2.2.2 Outcome

#### Console Output

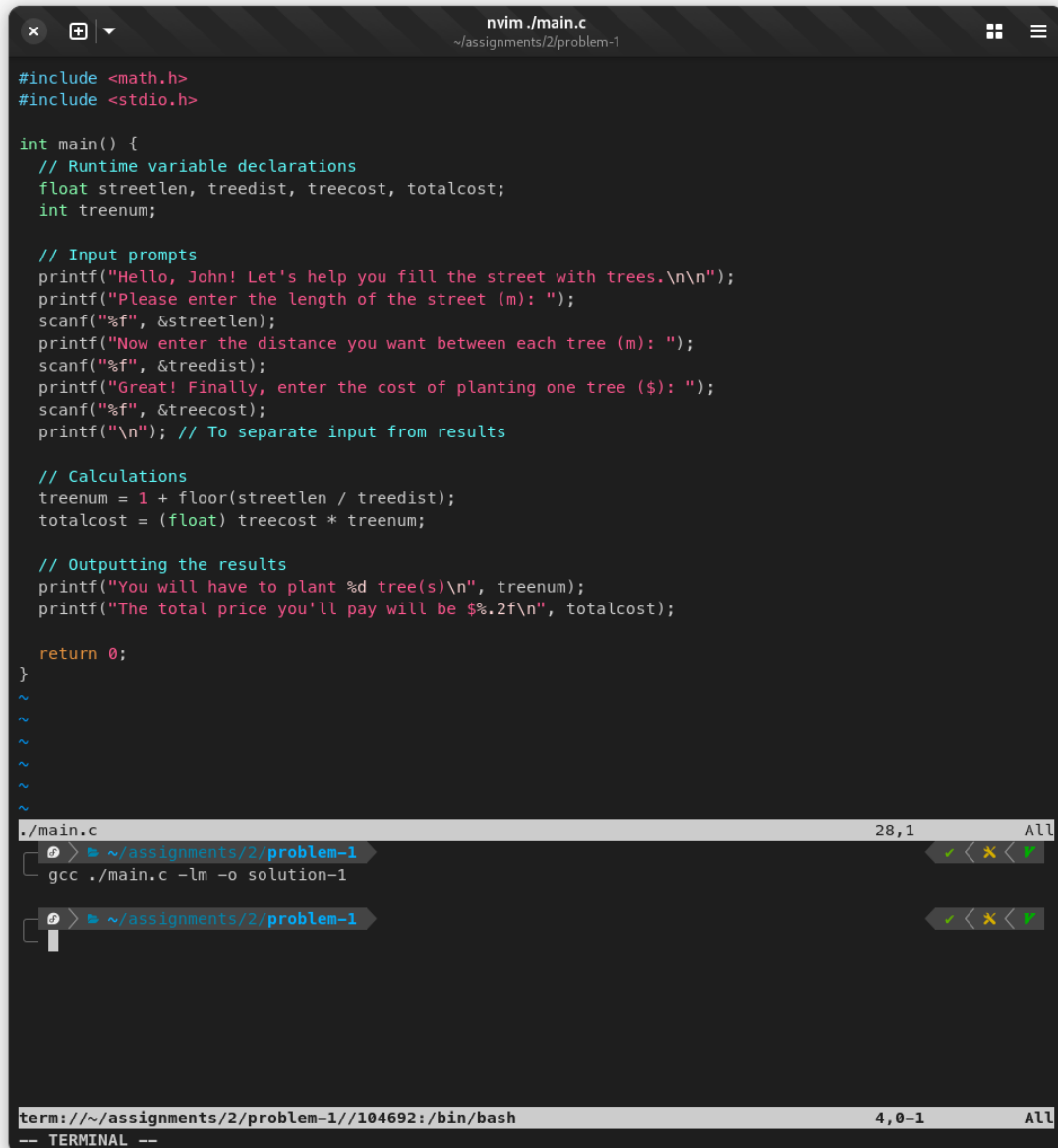
Program's output to console in plaintext

Number	Square	Cube	Root	Exponent
0	0	0	0.0	1.0
1	1	1	1.0	2.7
2	4	8	1.4	7.4
3	9	27	1.7	20.1
4	16	64	2.0	54.6
5	25	125	2.2	148.4

## 2.3 Evidence of Work (Screenshots)

### 2.3.1 Problem (1) Screenshots

#### Close Up Source-code Screenshot



The screenshot shows a code editor window titled "nvim ./main.c" with the file path "~/.assignments/2/problem-1". The code is a C program that calculates the number of trees to plant and the total cost. It includes headers for math and stdio, defines a main function with variable declarations, input prompts, calculations, and output statements. The code is as follows:

```
#include <math.h>
#include <stdio.h>

int main() {
    // Runtime variable declarations
    float streetlen, treedist, treecost, totalcost;
    int treenum;

    // Input prompts
    printf("Hello, John! Let's help you fill the street with trees.\n\n");
    printf("Please enter the length of the street (m): ");
    scanf("%f", &streetlen);
    printf("Now enter the distance you want between each tree (m): ");
    scanf("%f", &treedist);
    printf("Great! Finally, enter the cost of planting one tree ($): ");
    scanf("%f", &treecost);
    printf("\n"); // To separate input from results

    // Calculations
    treenum = 1 + floor(streetlen / treedist);
    totalcost = (float) treecost * treenum;

    // Outputting the results
    printf("You will have to plant %d tree(s)\n", treenum);
    printf("The total price you'll pay will be $%.2f\n", totalcost);

    return 0;
}
~
~
~
~
~
```

Below the code editor, there is a terminal window showing the command to compile the code:

```
./main.c 28,1 All
~/.assignments/2/problem-1
gcc ./main.c -lm -o solution-1
~/.assignments/2/problem-1
```

The terminal window also shows the command prompt and the file path:

```
term://~/.assignments/2/problem-1/104692:/bin/bash 4,0-1 All
-- TERMINAL --
```

## Close Up Output Console Screenshot

```
youssef@silverblue:~/assignments/2/problem-1
~/assignments/2/problem-1

youssef@silverblue:~/assignments/2/problem-1$ ./solution-1
Hello, John! Let's help you fill the street with trees.

Please enter the length of the street (m): 100
Now enter the distance you want between each tree (m): 10
Great! Finally, enter the cost of planting one tree ($): 12

You will have to plant 11 tree(s)
The total price you'll pay will be $132.00
youssef@silverblue:~/assignments/2/problem-1$
```

## Linux Desktop Screenshot

The screenshot shows a Linux desktop environment with three windows open:

- Code Editor (nvim):** Displays the C program `main.c` for Assignment 2. The code includes `<math.h>` and `<stdio.h>`, and implements a program that calculates the number of trees to plant and the total cost based on user input.
- Terminal:** Shows the execution of the program. It prompts for the length of the street (100m), distance between trees (10m), and cost per tree (\$12), resulting in 11 trees to be planted for a total cost of \$132.00.
- PDF Viewer:** Displays a PDF document titled "Lab 2 - Spring 2023.pdf" from Alexandria University. It contains instructions for the assignment and a table of values for squares, cubes, square roots, and exponents.

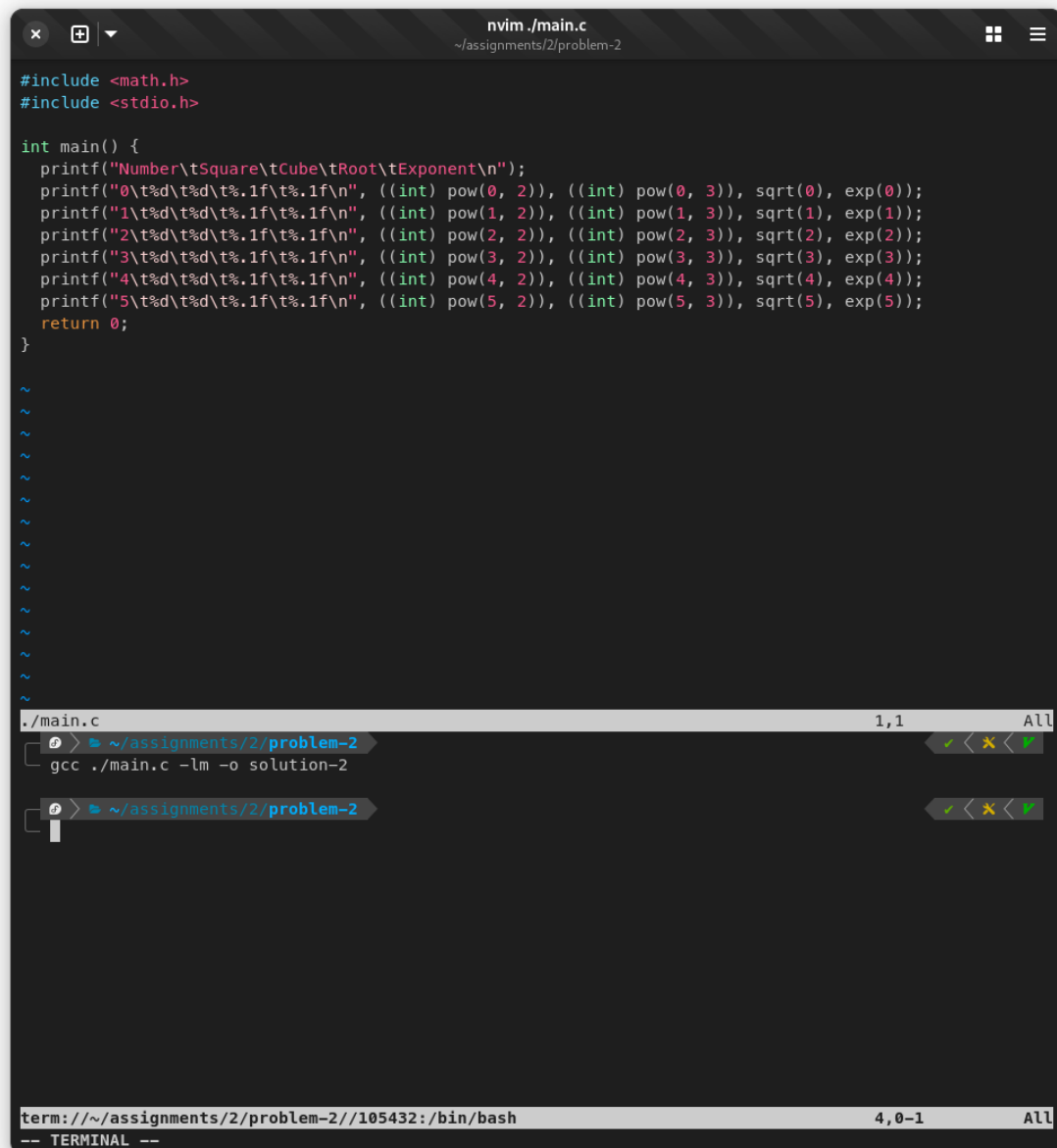
**Take home Assignments:**

- John is responsible for planting the street with trees; he can give you the **length** of the street in meters, the **distance** between each two trees in a meter, and the **cost** of planting each tree in dollars. Write a program that should read this information and then print the **number** of trees needed and the **total cost**.
- Write a program that calculates the **squares**, **cubes**, **square root**, and **exponent** ( $e^x$ ) of the numbers from 0 to 5 and uses tabs to print the following table of values:

Number	Square	Cube	Root	Exponent
0	0	0	0.0	1.0
..	..	..	..	..
..	..	..	..	..

## 2.3.2 Problem (2) Screenshots

### Close Up Source-code Screenshot



The screenshot shows a code editor window titled "nvim ./main.c" with the file path "~/assignments/2/problem-2". The code is a C program that calculates and prints various mathematical functions for values 0 through 5. The code is as follows:

```
#include <math.h>
#include <stdio.h>

int main() {
    printf("Number\tSquare\tCube\tRoot\tExponent\n");
    printf("0\t%d\t%d\t%.1f\t%.1f\n", ((int) pow(0, 2)), ((int) pow(0, 3)), sqrt(0), exp(0));
    printf("1\t%d\t%d\t%.1f\t%.1f\n", ((int) pow(1, 2)), ((int) pow(1, 3)), sqrt(1), exp(1));
    printf("2\t%d\t%d\t%.1f\t%.1f\n", ((int) pow(2, 2)), ((int) pow(2, 3)), sqrt(2), exp(2));
    printf("3\t%d\t%d\t%.1f\t%.1f\n", ((int) pow(3, 2)), ((int) pow(3, 3)), sqrt(3), exp(3));
    printf("4\t%d\t%d\t%.1f\t%.1f\n", ((int) pow(4, 2)), ((int) pow(4, 3)), sqrt(4), exp(4));
    printf("5\t%d\t%d\t%.1f\t%.1f\n", ((int) pow(5, 2)), ((int) pow(5, 3)), sqrt(5), exp(5));
    return 0;
}
```

Below the code editor, there is a terminal window. The terminal shows the command to compile the program:

```
./main.c 1,1 All
> ~/assignments/2/problem-2
gcc ./main.c -lm -o solution-2
> ~/assignments/2/problem-2
```

The terminal prompt is "term://~/assignments/2/problem-2//105432:/bin/bash" and the status bar shows "4,0-1 All".



## Close Up Output Console Screenshot

```
youssef@silverblue:~/assignments/2/problem-2$ ./solution-2
Number Square Cube Root Exponent
0 0 0 0.0 1.0
1 1 1 1.0 2.7
2 4 8 1.4 7.4
3 9 27 1.7 20.1
4 16 64 2.0 54.6
5 25 125 2.2 148.4
youssef@silverblue:~/assignments/2/problem-2$
```

## Linux Desktop Screenshot

The screenshot shows a Linux desktop environment with three windows open. The left window is a code editor (nvim) showing the source code for the program. The middle window is a terminal showing the execution of the program. The right window is a PDF document titled 'Lab 2 - Spring 2023.pdf'.

**Code Editor (nvim) Content:**

```
#include <math.h>
#include <stdio.h>

int main() {
    printf("Number\tSquare\tCube\tRoot\tExponent\n");
    printf("%d\t%d\t%d\t%.1f\t%.1f\n", (int) pow(0, 2), (int) pow(0, 3), sqrt(0), exp(0));
    printf("%d\t%d\t%d\t%.1f\t%.1f\n", (int) pow(1, 2), (int) pow(1, 3), sqrt(1), exp(1));
    printf("%d\t%d\t%d\t%.1f\t%.1f\n", (int) pow(2, 2), (int) pow(2, 3), sqrt(2), exp(2));
    printf("%d\t%d\t%d\t%.1f\t%.1f\n", (int) pow(3, 2), (int) pow(3, 3), sqrt(3), exp(3));
    printf("%d\t%d\t%d\t%.1f\t%.1f\n", (int) pow(4, 2), (int) pow(4, 3), sqrt(4), exp(4));
    printf("%d\t%d\t%d\t%.1f\t%.1f\n", (int) pow(5, 2), (int) pow(5, 3), sqrt(5), exp(5));
    return 0;
}
```

**Terminal Content:**

```
youssef@silverblue:~/assignments/2/problem-2$ ./solution-2
Number Square Cube Root Exponent
0 0 0 0.0 1.0
1 1 1 1.0 2.7
2 4 8 1.4 7.4
3 9 27 1.7 20.1
4 16 64 2.0 54.6
5 25 125 2.2 148.4
youssef@silverblue:~/assignments/2/problem-2$
```

**PDF Document Content:**

Alexandria University  
Faculty of Engineering  
Specialized Scientific Programs

Computer and Communication  
CSE016 Computers & Programming

**Take home Assignments:**

- John is responsible for planting the street with trees; he can give you the **length** of the street in meters, the **distance** between each two trees in a meter, and the **cost** of planting each tree in dollars. Write a program that should read this information and then print the **number** of trees needed and the **total cost**.
- Write a program that calculates the **squares**, **cubes**, **square root**, and **exponent** ( $e^x$ ) of the numbers from 0 to 5 and uses tabs to print the following table of values:

Number	Square	Cube	Root	Exponent
0	0	0	0.0	1.0
1	1	1	1.0	2.7
2	4	8	1.4	7.4
3	9	27	1.7	20.1
4	16	64	2.0	54.6
5	25	125	2.2	148.4

## 2.4 Specifications

- **Libraries:**

- `stdio.h`
- `math.h`

- **Compiler:** GNU C Compiler (`gcc`) version 13.2.1 20231205 (Red Hat 13.2.1-6)

- **Supported Platforms:** OS: (any), architecture: (any)

- **Tested On:**

- Compiled on Fedora 39 Workstation Linux
- Ran on Fedora 39 Silverblue Workstation Linux

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