

**ASSIGNMENT #1**  
**INTRODUCTION TO C LANGUAGE**  
**CS3540 SYSTEM PROGRAMMING WITH C AND LINUX**  
**SPRING 2015**

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**Assignment Description:****CS3540 Assignment No.1**

Due Wednesday, Jan 13.

1. Estimate the height of a building, given the height of a person,  $h$ , the distance from the building,  $D$ , and the elevation angle,  $\theta$ , in degrees. Develop a C program to compute the height of a building using the mathematical formula:

$$bh = h + D \times \tan(\theta \pi / 180)$$

2. Develop a C program to compute the distance between two points on a circle in the X-Y plane. Use the mathematical expression for computing the distance between two points in the X-Y plane:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

**Solution Details:**

All solutions are developed on Debian 7 running within VirtualBox 4.3.20 hosted by Windows 8.1 environment. Debian 7's default GNU Compiler is used to compile the source files.

**Solution to Problem 1)**

Solution assumes user would input the data required correctly. There are no input validations at the moment. (Not specified by the assignment.) Solution uses *tan* function from C's standard math library. Therefore, source code is compiled with math module.

*Source:*

---

```
00000001 // Spring 2015 - CS3540 - Systems Programming w/ C
00000002 // Assignment 1 Question 1
00000003 // Baturay Daylak
00000004
00000005 #include<stdio.h>
00000006 #include<math.h>
00000007 int main()
00000008 {
00000009     float bh, h, D, theta;
00000010     printf("\n-----\n");
00000011     printf("Assignment 1 Question 1 - CS3540 - Baturay Daylak\n");
00000012     printf("-----\n");
00000013     printf("Please enter the height of the person: ");
00000014     scanf("%f", &h);
00000015     printf("Please enter the distance from the building: ");
00000016     scanf("%f", &D);
00000017     printf("Please enter the elevation angle: ");
```

```
00000018     scanf("%f", &theta);
00000019     bh = h + D * tan(M_PI*theta/180.0);
00000020     printf("-----\n");
00000021     printf("Height of the building is %.2f\n", bh);
00000022     printf("-----\n\n");
00000023     return 0;
00000024 }
```

### *Output*

---

```
Script started on Mon 12 Jan 2015 04:41:33 PM EST
baturay@debian:~/CS3540/Assignments/1$ ./a1
```

```
-----
Assignment 1 Question 1 - CS3540 - Baturay Daylak
-----

Please enter the height of the person: 5
Please enter the distance from the building: 10
Please enter the elevation angle: 45
-----

Height of the building is 15.00
-----
```

```
baturay@debian:~/CS3540/Assignments/1$ exit
exit
```

```
Script done on Mon 12 Jan 2015 04:41:40 PM EST
```

**Solution to Problem 2)**

Solution assumes user would input the data required correctly. There are no input validations at the moment. (Not specified by the assignment.) Solution uses *pow* and *sqrt* functions from C's standard math library. Therefore, source code is compiled with math module.

*Source:*

---

```
00000001 // Spring 2015 - CS3540 - Baturay Daylak
00000002 // Assignment 1 Question 2
00000003
00000004 #include<stdio.h>
00000005 #include<math.h>
00000006
00000007 int main()
00000008 {
00000009     float d, x1, x2, y1, y2;
00000010     printf("\n-----");
00000011     printf("\nAssignment 1 Question 2 - CS3540 - Baturay Daylak");
00000012     printf("\n-----\n");
00000013     printf("Please enter first X coordinate: ");
00000014     scanf("%f", &x1);
00000015     printf("Please enter second X ccoordinate: ");
00000016     scanf("%f", &x2);
00000017     printf("Please enter first Y coordinate: ");
00000018     scanf("%f", &y1);
00000019     printf("Please enter second Y coordinate: ");
00000020     scanf("%f", &y2);
00000021
00000022     d = sqrt( pow(x2-x1, 2) + pow(y2-y1, 2) );
00000023
```

```
00000024    printf("-----\n");
00000025    printf("Distance between two points is %.3f\n", d);
00000026    printf("-----\n\n");
00000027    return 0;
00000028 }
```

### *Output:*

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```
Script started on Mon 12 Jan 2015 04:42:36 PM EST
baturay@debian:~/CS3540/Assignments/2$ ./a2
```

```
-----
Assignment 1 Question 2 - CS3540 - Baturay Daylak
-----
```

```
Please enter first X coordinate: 10
Please enter second X ccoordinate: 5
Please enter first Y coordinate: 10
Please enter second Y coordinate: 4
```

```
-----
Distance between two points is 7.810
-----
```

```
baturay@debian:~/CS3540/Assignments/2$ exit
exit
```

```
Script done on Mon 12 Jan 2015 04:42:45 PM EST
```