Programming Assignment 1 – Draw House Report

I started the code with a printChar function in order to let me print the characters of the house.

```c
void printChar(int n, char c){
    int i; //Loop variable
    for(i=0 ; i<n ; i++) printf("%c",c); // Each iteration print one character c.
}
```

Setting up the parameters given in the question and the variables for the for loops.

```c
int main(){
    int r_top = 40, r_side = 16, r_bottom = 72; //Parameters given in the assignment
    int i, j; //Loop variables
```

Print what's given in the assignment example

```c
printf("***** Design parameters of the house:\n");
printf("   <<< The top of the roof: 40\n");
printf("   <<< The side of the roof: 16\n");
printf("   <<< The bottom of the roof: 72\n");
printf("   <<< The width of the door: 20\n");
printf("   <<< The height of the door: 28\n");
printf("   <<< The width of the window: 16\n");
printf("   <<< The height of the window: 25\n");
printf("   <<< The width of the window glass: 4\n");
printf("   <<< The height of the window glass: 5\n");
printf("   <<< The space from the window/door to the ceiling: 10\n"); // Print the space from the window/door to the ceiling
printf("   <<< The space between the floor and the door: 2\n"); // Print the space between the floor and the door
printf("   <<< The space between the floor and the window: 5\n");
printf("   <<< The space from the window to the wall: 2\n"); // Print the space from the window to the wall
printf("   <<< The space between the window and the door: 4\n"); // Print the space between the window and the door
printf("\n"); // Print a newline
printf("***** The house design is valid.\n");
printf("   <<< The total width of the house: 72\n");
printf("   <<< The total height of the house: 62\n");
printf("   <<< The exterior width of the house: 68\n");
printf("   <<< The exterior height of the house: 44\n");
printf("   <<< The interior width of the house: 64\n");
printf("   <<< The interior height of the house: 40\n");
printf("\n\n");
```

Print the first row of the roof

```
printChar(r_side,' '); // Print the blanks of the first row of the roof
printChar(r_top, '#'); // Print the first row of the roof
```

Print the rest of the roof

```
for(i = 0; i < r_side ; i++){ //Print each row, print side and interior points
    printChar(r_side - i -1, ' '); // Print blanks
    printChar(1,'#'); //Print the left side
    printChar(2 * i + r_top, '*'); //Print the interior points
    printChar(1, '#');  //Print the right side
    printf("\n"); //Print a newline
}
printChar(r_bottom, '#'); //Print the bottom of the roof
```

Print the ceiling of the house

```
//Print the ceiling
for(i=0 ; i<2 ; i++){
    printChar(2,' ');
    printChar(68, '@');
    printf("\n");
}
```

Print the space from the ceiling to the door

```
//Print the space from the ceiling the to the door
for(i=0 ; i<10 ; i++){
    printChar(2,' ');
    printChar(2, '@');
    printChar(64, ' ');
    printChar(2, '@');
    printf("\n");
}
```

First print the first row of the window and then print the 2nd to the 6th row of the window with for loop since they are the same. After that use another for loop to print 1st to the 6th row for four times and then print the last row.

```
for(i=0 ; i < 4 ; i++){
    printChar(2, ' ');
    printChar(2, '@');
    printChar(2, ' ');
    printChar(16, '=');
    printChar(4, ' ');
    printChar(20, '&');
    printChar(4, ' ');
    printChar(16, '=');
    printChar(2, ' ');
    printChar(2, '@');
    printf("\n");
        //Print the 2nd~6th row of the window using for loop
        for(j=0 ; j < 5 ; j++){
            printChar(2, ' ');
            printChar(2, '@');
            printChar(2, ' ');
            printChar(1, '=');
            printChar(4, ' ');
            printChar(1, '+');
            printChar(4, ' ');
            printChar(1, '+');
            printChar(4, ' ');
            printChar(1, '=');
            printChar(4, ' ');
            printChar(20, '&');
            printChar(4, ' ');
            printChar(1, '=');
            printChar(4, ' ');
            printChar(1, '+');
            printChar(4, ' ');
            printChar(1, '+');
            printChar(4, ' ');
            printChar(1, '=');
            printChar(2, ' ');
            printChar(2, '@');
            printf("\n");
        }
}

//Print the last row of the window
printChar(2, ' ');
printChar(2, '@');
printChar(2, ' ');
printChar(16, '=');
printChar(4, ' ');
printChar(20, '&');
printChar(4, ' ');
printChar(16, '=');
printChar(2, ' ');
printChar(2, '@');
printf("\n");
```

Print the rest of the door

```
//Print the rest of the door
for(i = 0 ; i < 3 ; i++){
    printChar(2, ' ');
    printChar(2, '@');
    printChar(22, ' ');
    printChar(20, '&');
    printChar(22, ' ');
    printChar(2, '@');
    printf("\n");
}
```

Print the space between the floor and the door

```
//Print the space between the floor and the door
for(i=0 ; i < 2 ; i++){
    printChar(2,' ');
    printChar(2, '@');
    printChar(64, ' ');
    printChar(2, '@');
    printf("\n");
}
```

Print the floor of the house

```
//Print the floor of the house
for(i = 0 ; i < 2 ; i++){
printChar(2,' ');
printChar(68, '@');
printf("\n");
}
```

Calculation for the verification of the validation

The total width of the house:

The total width of the house is equal to the bottom of the roof

r_top + 2 * r_side = 40 + 2 * 16 = 72

The total height of the house:

First row of the roof(1) + Side of the roof(16) + Bottom of the roof(1) + Ceiling(2) + The space from the ceiling to the door(10) + The height of the door(28) + The space from the door to the floor(2) + The floor(2)

= 1 + 16 + 1 + 2 + 10 + 28 + 2 + 2 = 62

The exterior width of the house:

Thickness of the wall(2) + The space from the window to the wall(2) + The width of the window(16) + The space between the window and the door(4) + The width of the door(20) + The space between the window and the door(4) + The width of the window(16) + The space from the window to the wall(2) + The thickness of the wall(2)

= 2 + 2 + 16 + 4 + 20 + 4 + 16 + 2 + 2 = 68

The exterior height of the house:

The total height of the house(62) – First row of the roof(1) – Side of the roof(16) – Bottom of the roof(1)

= 62 – 1 – 16 – 1 = 44

The interior width of the house:

The exterior width of the house(68) – Thickness of the house(2) * 2

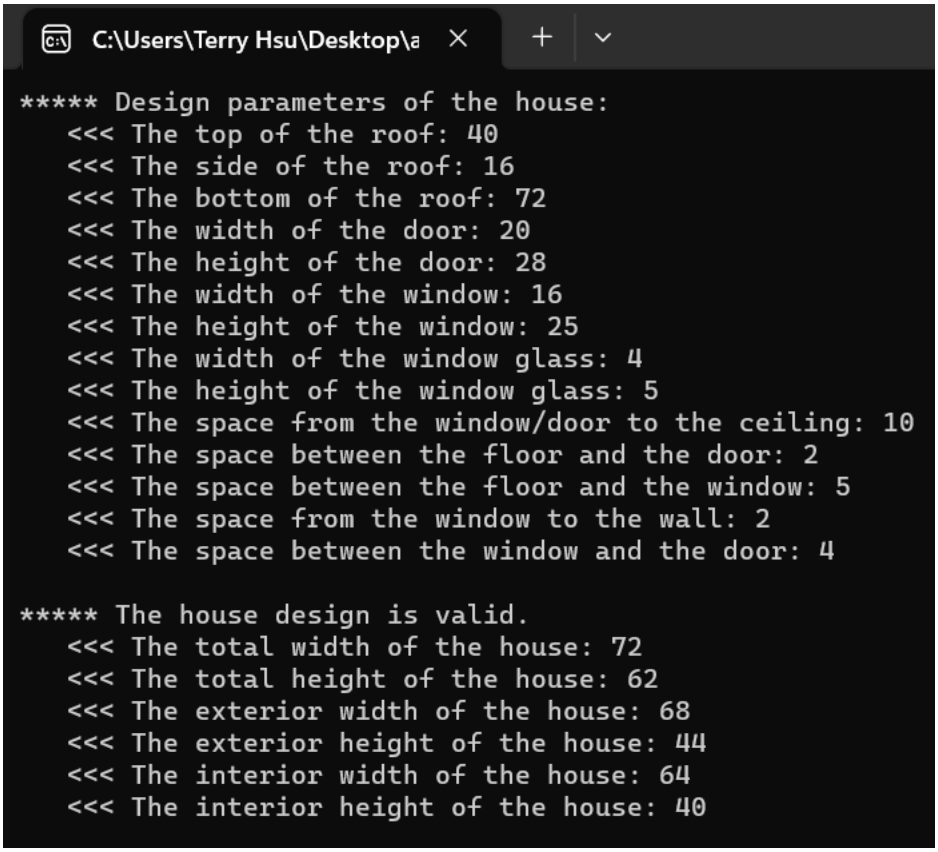
= 68 – 2 * 2 = 64

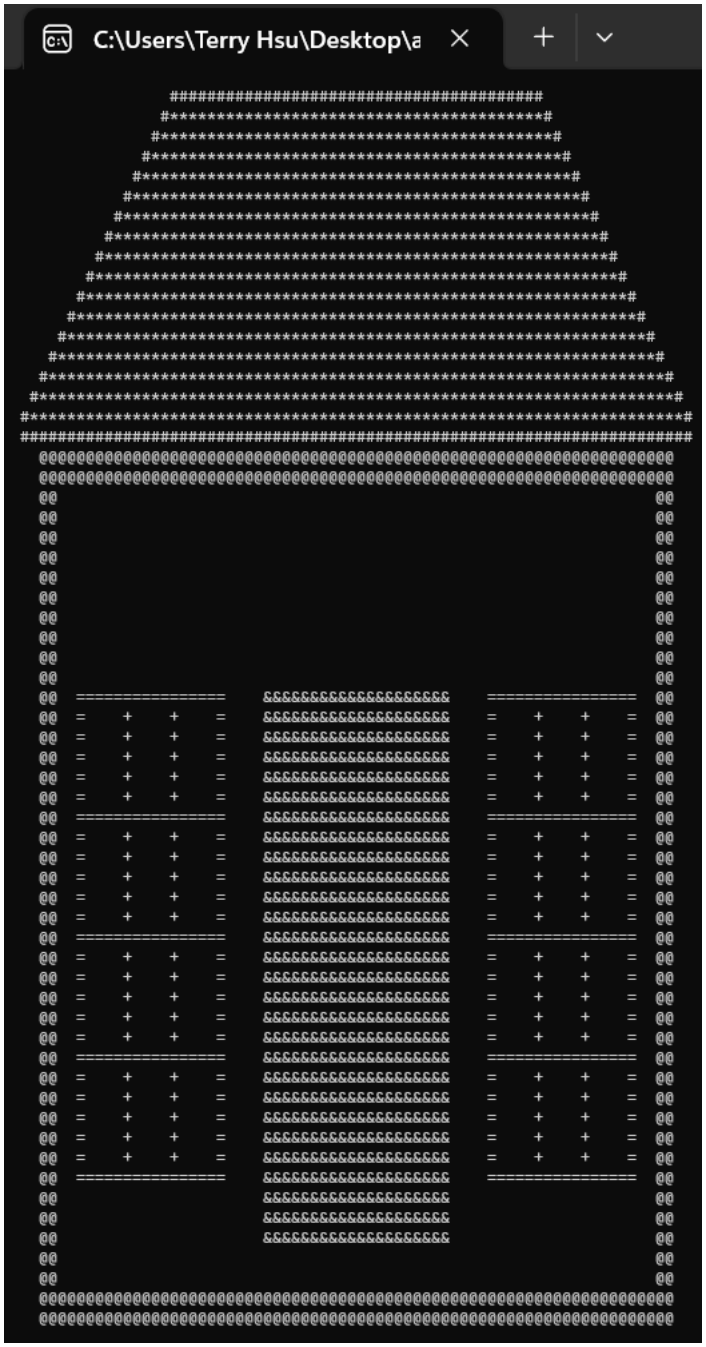
The interior height of the house:

The exterior height of the house(44) – Ceiling(2) – Floor(2)

=44 – 2 – 2 = 40

Program Results

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