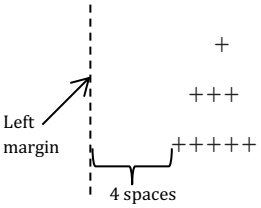
Question 2:

Write a program that, prints a 'pine tree' consisting of triangles of increasing sizes, filled with a character (eg. '*' or '+' or '$' etc).
Your program should interact with the user to read the number of triangles in the tree and the character filling the tree.

Your implementation should include the following functions:

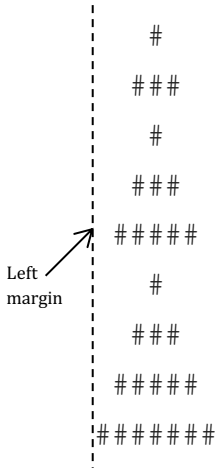
a. `void printShiftedTriangle(int n, int m, char symbol)`
   It prints an `n`-line triangle, filled with `symbol` characters, shifted `m` spaces from the left margin.

   For example, if we call `printShiftedTriangle(3, 4, `+`)`, the expected output is:



b. `void printPineTree(int n, char symbol)`
   It prints a sequence of `n` triangles of increasing sizes (the smallest triangle is a 2-line triangle), which form the shape of a pine tree. The triangles are filled with the `symbol` character.

   For example, if we call `printPineTree(3, `#`)`, the expected output is:



Question 3:

The number ***e*** is an important mathematical constant that is the base of the natural logarithm. ***e*** also arises in the study of compound interest, and in many other applications.

Background of e: https://en.wikipedia.org/wiki/E_(mathematical_constant)

e can be calculated as the sum of the infinite series:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \cdots$$

The value of e is approximately equal to 2.71828. We can get an approximate value of ***e***, by calculating only a partial sum of the infinite sum above (the more addends we add, the better approximation we get).

Implement the function:

`double eApprox(int n)`

This function is given a positive integer n, and returns an approximation of ***e***, calculated by the sum of the first (n+1) addends of the infinite sum above.

To test your function use the following main:

```
int main() {
    cout.precision(30);

    for (int n = 1; n <= 15; n++) {
        cout<<"n = "<<n<<'\t'<<eApprox(n)<<endl;
    }

    return 0;
}
```

Notes:

1. Pay attention to the running time of `eApprox`. An efficient implementation would run in $\Theta(n)$.
2. Since the values of the factorials will grow to be very large, use a variable of type `double` to store them.

Question 4:

a. Implement a function:
`void printDivisors(int num)`
This function is given a positive integer `num`, and prints all of `num`'s divisors in an **ascending order**, separated by a space.
For Example, if we call `printDivisors(100)`, the expected output is:
1 2 4 5 10 20 25 50 100

Implementation requirement: Pay attention to the running time of your function. An efficient implementation would run in $\Theta(\sqrt{num})$.

b. Use the function above when implementing a program that reads from the user a positive integer (≥2), and prints all it's divisors.
Your program should interact with the user **exactly** as it shows in the following example:
Please enter a positive integer >= 2: 100
1 2 4 5 10 20 25 50 100

Question 5:

Use the definition of Θ in order to show the following:

a. $5n^3 + 2n^2 + 3n = \Theta(n^3)$
b. $\sqrt{7n^2 + 2n - 8} = \Theta(n)$