Average of a stream of numbers

Difficulty Level: Rookie
Given a stream of numbers, print average (or mean) of the stream at every point. For example, let us consider the stream as 10, 20, 30, 40, 50, 60, …

```
Average of 1 numbers is 10.00
Average of 2 numbers is 15.00
Average of 3 numbers is 20.00
Average of 4 numbers is 25.00
Average of 5 numbers is 30.00
Average of 6 numbers is 35.00
.................
```

To print mean of a stream, we need to find out how to find average when a new number is being added to the stream. To do this, all we need is count of numbers seen so far in the stream, previous average and new number.
Let *n* be the count, *prev_avg* be the previous average and x be the new number being added. The average after including *x* number can be written as *(prev_avg*n + x)/(n+1)*.

```
#include <stdio.h>

// Returns the new average after including x
float getAvg(float prev_avg, int x, int n)
{
    return (prev_avg*n + x)/(n+1);
}

// Prints average of a stream of numbers
void streamAvg(float arr[], int n)
{
   float avg = 0;
   for(int i = 0; i < n; i++)
   {
       avg  = getAvg(avg, arr[i], i);
       printf("Average of %d numbers is %f \n", i+1, avg
   }
   return;
}
```

```
// Driver program to test above functions
int main()
{
    float arr[] = {10, 20, 30, 40, 50, 60};
    int n = sizeof(arr)/sizeof(arr[0]);
    streamAvg(arr, n);

    return 0;
}
```

The above function getAvg() can be optimized using following changes. We can avoid the use of prev_avg and number of elements by using static variables (Assuming that only this function is called for average of stream). Following is the oprimnized version.

```
#include <stdio.h>

// Returns the new average after including x
float getAvg (int x)
{
    static int sum, n;

    sum += x;
    return (((float)sum)/++n);
}

// Prints average of a stream of numbers
void streamAvg(float arr[], int n)
{
   float avg = 0;
   for(int i = 0; i < n; i++)
   {
       avg  = getAvg(arr[i]);
       printf("Average of %d numbers is %f \n", i+1, avg
   }
   return;
}

// Driver program to test above functions
int main()
{
    float arr[] = {10, 20, 30, 40, 50, 60};
    int n = sizeof(arr)/sizeof(arr[0]);
```

```
    streamAvg(arr, n);

    return 0;
}
```