

# DISCRETE ASSIGNMENT

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# Question

Consider the sequence whose  $n^{\text{th}}$  term is given by  $2^n$ . Find the first 6 terms of this sequence. (NCERT)

Variable	Description	Value
$x(n)$	general term of sequence	$2^n u(n)$

Table: input parameters

$$X(Z) = \frac{1}{1 - 2z^{-1}} \quad |z| > |2| \quad (1)$$

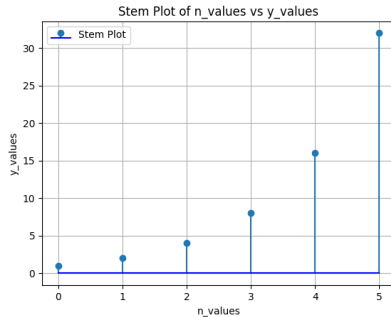


Figure: Six terms of the given sequence

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

void linespace(int start, int stop, int step, int* n_values, int*
    y_values, int num_values) {
    for (int i = 0; i < num_values; ++i) {
        n_values[i] = start + i * step;
        y_values[i] = (int)pow(2, n_values[i]); // Adjust this
            line based on your specific calculation
    }
}
```

```
int main() {  
    // Define the range and step size  
    int start = 0;  
    int stop = 5;  
    int step = 1;  
  
    // Calculate the number of values in the range  
    int num_values = (stop - start) / step + 1;  
  
    // Allocate arrays to store the generated values  
    int n_values[num_values];  
    int y_values[num_values];  
  
    // Call the linspace function  
    linspace(start, stop, step, n_values, y_values, num_values);  
}
```

```
// Save data to a file
FILE* file = fopen("output.dat", "w");

if (file != NULL) {
    for (int i = 0; i < num_values; ++i) {
        fprintf(file, "%d %d\n", n_values[i], y_values[i]);
    }

    fclose(file);
    printf("Data saved to 'output.dat'.\n");
} else {
    printf("Error opening file for writing.\n");
}

return 0;
}
```



```
import matplotlib.pyplot as plt
import numpy as np

# Load data from the "output.dat" file using numpy's loadtxt
data = np.loadtxt("output.dat")

# Extract n_values and y_values from the data
n_values = data[:, 0].astype(int)
y_values = data[:, 1].astype(int)
```

```
# Create a stem plot
plt.stem(n_values, y_values, linefmt='|', markerfmt='o', basefmt='b',
        label='Stem Plot')

plt.xlabel('n_values')
plt.ylabel('y_values')
plt.title('Stem Plot of n_values vs y_values')
plt.grid(True)
plt.legend()

plt.savefig('figs/fig1.png')
```