

```

runner% cat graph_two_dim.c
#include <stdio.h>
#include <math.h>
#define ROWS 101
#define COLS 62
#define PI 3.14159265358979

double f(double x, int n);
void init_d(char d[][COLS]);
void display_d(char d[][COLS]);
void display2_d(char d[][COLS]);

void main(void)
{
    int i, j;
    double x = 0.0;
    char d[ROWS][COLS];
    int n;
    scanf("%d", &n);
    init_d(d);
    for (i = 0; i < ROWS; i++) {
        j = (int)(50*f(x, n));
        if (j < 0) d[i][0] = '*';
        else if (j > 61) d[i][61] = '*';
        else d[i][j] = '+';
        x = x + (1.0/30.0);
    }
    display_d(d);
    printf("\n-----\n\n");
    display2_d(d);
}

double f(double x, int n)
{
    int i;
    double sum = 0.0;
    double sign = 1.0;
    for (i = 1; i <= n; i++) {
        sum = sum + (sign/i)*sin(i*x);
        sign = -sign;
    }
    return (2.0/PI)*sum;
}

void init_d(char d[][COLS])
{
    int i, j;
    for (i = 0; i < ROWS; i++)
        for (j = 0; j < COLS; j++)
            d[i][j] = ' ';
}

void display_d(char d[][COLS])
{
    int i, j;
    for (i = 0; i < ROWS; i++) {
        if ((i%6) == 0) printf("%4.1f-", i*(1.0/30.0));
        else printf(" ");
        for (j = 0; j < COLS; j++)
            printf("%c", d[i][j]);
        printf("\n");
    }
}

void display2_d(char d[][COLS])
{
    int i, j;
    for (j = COLS - 2; j >= 0; j--) {
        if ((j%10) == 0) printf("%4.1f-", j*(1.0/50.0));
        else printf(" ");
        for (i = 0; i < ROWS; i++)
            printf("%c", d[i][j]);
        printf("\n");
    }
}

runner% cc -o graph_two_dim graph_two_dim.c -lm
runner% graph_two_dim
10

```

