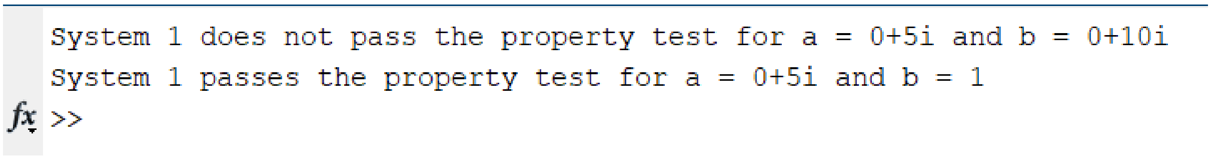
Part 1)

First I have run the example system and property test to understand how tests and systems work in the MATLAB environment.



```
System 1 does not pass the property test for a = 0+5i and b = 0+10i
System 1 passes the property test for a = 0+5i and b = 1
>>
```

(Figure 1: Example Code's Output)

In this system, when b is not a real number, changing the order of multiplication and addition does not give the correct result. After understanding this example implementation, I have implemented five systems that I will experiment on.

I have implemented the systems in MATLAB, the code can be found at the end of this report. Before moving on to results, I believe it would be better to go through theoretical results for each system in terms of linearity, time-invariance, and causality.

Given Systems are,

a) $y[n] = nx[n + 2]$, **b)** $y[n] = x[2n]$

c) $y[n] = 3x[n + 4] + 5$, **d)** $y[n] = |x[n]|$

e) $y[n] = \sum_{k=1}^{n} x[k]$

For linearity,

If sequence 1 is $x_1[n]$, and sequence 2 is $x_2[n]$, the outputs of the system are $y_1[n]$ and $y_2[n]$ respectively. Let α and β be integers, if

$$\alpha y_1[n] + \beta y_2[n] = y[n] = \alpha x_1[n] + \beta x_2[n]$$

the system is said to be linear where y[n] is output for the left-hand side sum of input sequences.

By applying this test, it can be concluded that systems a, b and e are linear since both sides of the equation give the same result. Again by using the same tests it can be said system d is not linear since for $\alpha = 1,\ \beta =- 1$,

$$1 * |x_1[n]| - 1|x_2[n]| \neq |1 * x_1[n]| + |- 1 * x_2[n]|$$

Similarly, system c is not linear since for $\alpha = 2,\ \beta = 2$

$$2 * (3x_1[n + 4] + 5) + 2 * (3x_2[n + 4] + 5) \neq 2 * 3x_1[n + 4] + 5 + 2 * 3x_2[n + 4] + 5$$

For time invariance

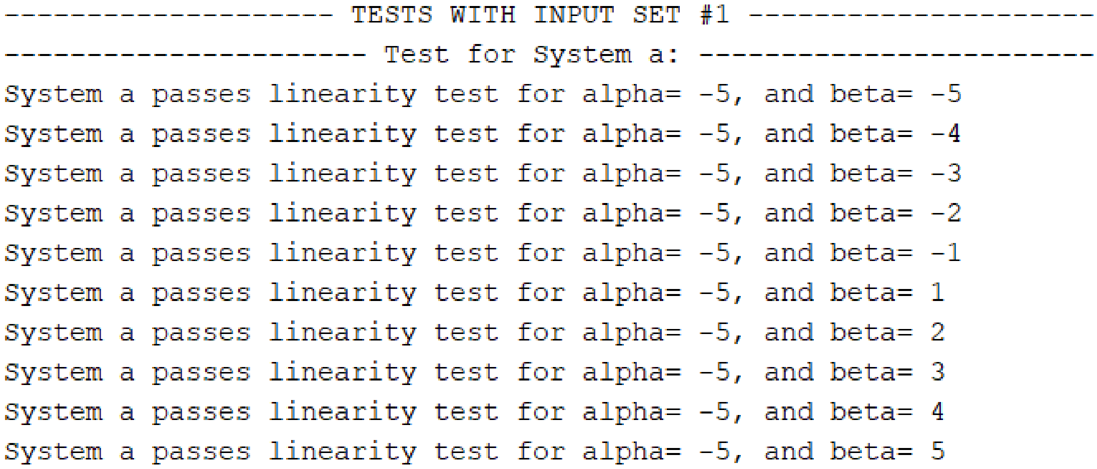
If sequence 1 is $x_1[n]$, and sequence 2 is $x_2[n]$, the outputs of the system are $y_1[n]$ and $y_2[n]$ respectively. Let n_0 be an integer delay amount, if $y[n - n_0] = w[n]$ where w[n] is the output of the system for the input $x[n - n_0]$, system is said to be time-invariant. As a result of this test, systems c, d and e are time-invariant. However, systems a and b are time-variant.

For causality, a system is said to be causal if the system does not use any future values. By looking at the systems, it can be concluded that systems a, b and c are not causal. Since for n = 2, system a needs the value of n = 4. Similarly, for n = 2, system b needs the value of n = 4, and system c needs n=6 for n = 2. Similarly, it can be said that systems d and e are causal since do not use any future values.

Part 2)

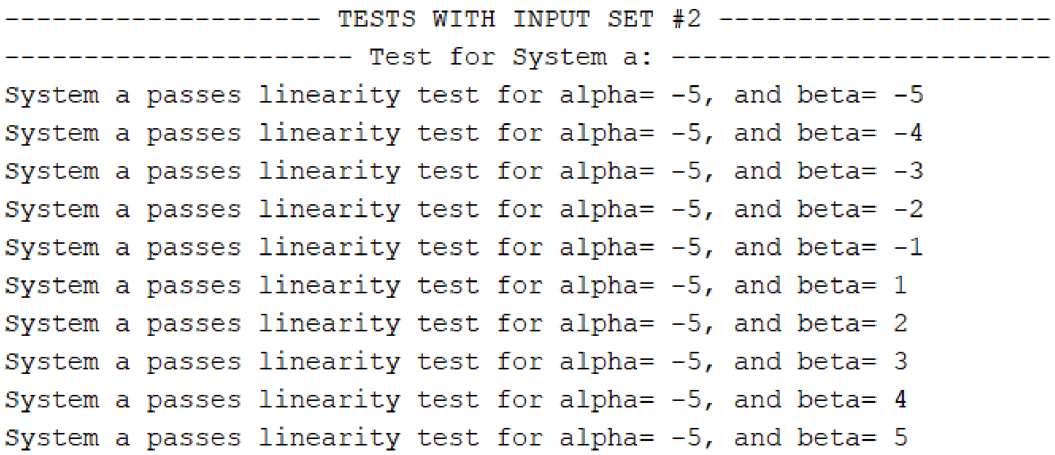
For this part, I have run the test for 100 combinations of α and β for each system and each input set.

System a passed the linearity test for every combination with each of two input sets.



```
-------------------- TESTS WITH INPUT SET #1 ---------------------
---------------------- Test for System a: ------------------------
System a passes linearity test for alpha= -5, and beta= -5
System a passes linearity test for alpha= -5, and beta= -4
System a passes linearity test for alpha= -5, and beta= -3
System a passes linearity test for alpha= -5, and beta= -2
System a passes linearity test for alpha= -5, and beta= -1
System a passes linearity test for alpha= -5, and beta= 1
System a passes linearity test for alpha= -5, and beta= 2
System a passes linearity test for alpha= -5, and beta= 3
System a passes linearity test for alpha= -5, and beta= 4
System a passes linearity test for alpha= -5, and beta= 5
```

(Figure 2: Linearity test results for System a with input set 1)

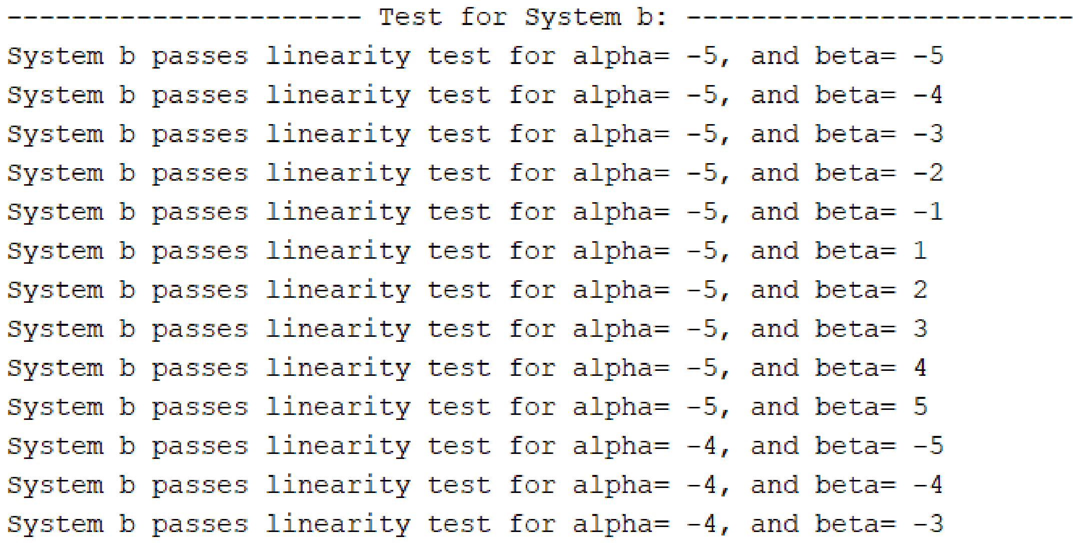


```
-------------------- TESTS WITH INPUT SET #2 ---------------------
---------------------- Test for System a: ------------------------
System a passes linearity test for alpha= -5, and beta= -5
System a passes linearity test for alpha= -5, and beta= -4
System a passes linearity test for alpha= -5, and beta= -3
System a passes linearity test for alpha= -5, and beta= -2
System a passes linearity test for alpha= -5, and beta= -1
System a passes linearity test for alpha= -5, and beta= 1
System a passes linearity test for alpha= -5, and beta= 2
System a passes linearity test for alpha= -5, and beta= 3
System a passes linearity test for alpha= -5, and beta= 4
System a passes linearity test for alpha= -5, and beta= 5
```

(Figure 3: Linearity test results for System a with input set 2)

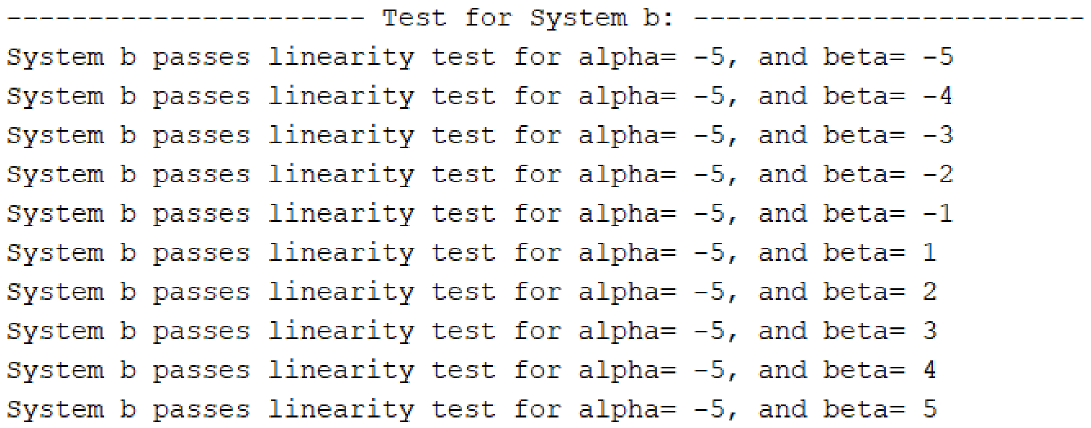
Since system a passed the tests for every value, it can be concluded that System a is linear. This also complies with the theoretical analysis in Part 1 of this report.

System b also passed each test in this part for each of the input sets.



```
---------------------- Test for System b: ------------------------
System b passes linearity test for alpha= -5, and beta= -5
System b passes linearity test for alpha= -5, and beta= -4
System b passes linearity test for alpha= -5, and beta= -3
System b passes linearity test for alpha= -5, and beta= -2
System b passes linearity test for alpha= -5, and beta= -1
System b passes linearity test for alpha= -5, and beta= 1
System b passes linearity test for alpha= -5, and beta= 2
System b passes linearity test for alpha= -5, and beta= 3
System b passes linearity test for alpha= -5, and beta= 4
System b passes linearity test for alpha= -5, and beta= 5
System b passes linearity test for alpha= -4, and beta= -5
System b passes linearity test for alpha= -4, and beta= -4
System b passes linearity test for alpha= -4, and beta= -3
```

(Figure 4: Linearity test results for System b with input set 1)

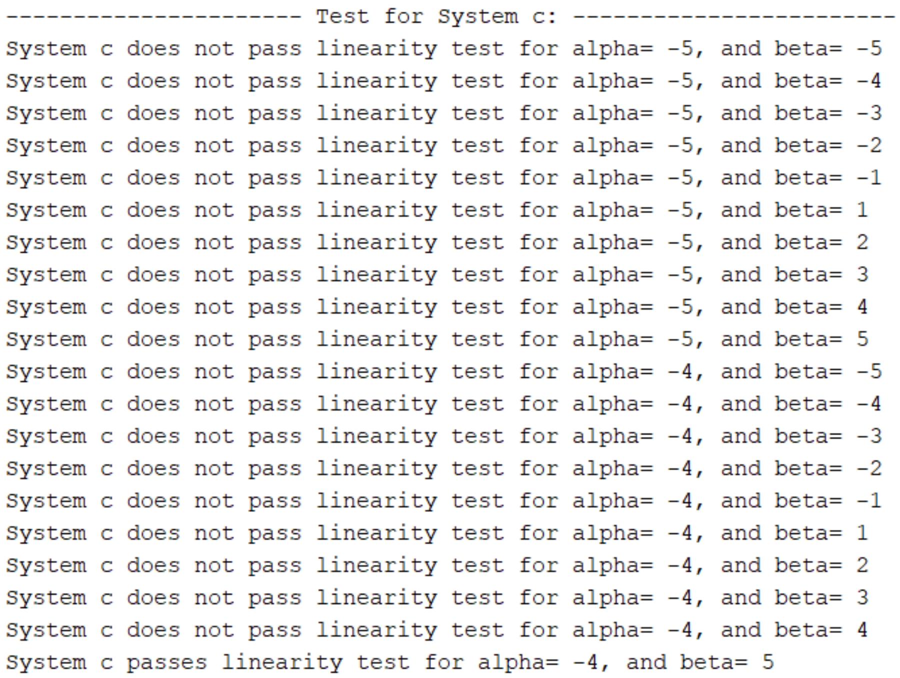


```
---------------------- Test for System b: ------------------------
System b passes linearity test for alpha= -5, and beta= -5
System b passes linearity test for alpha= -5, and beta= -4
System b passes linearity test for alpha= -5, and beta= -3
System b passes linearity test for alpha= -5, and beta= -2
System b passes linearity test for alpha= -5, and beta= -1
System b passes linearity test for alpha= -5, and beta= 1
System b passes linearity test for alpha= -5, and beta= 2
System b passes linearity test for alpha= -5, and beta= 3
System b passes linearity test for alpha= -5, and beta= 4
System b passes linearity test for alpha= -5, and beta= 5
```

(Figure 5: Linearity test results for System b with input set 2)

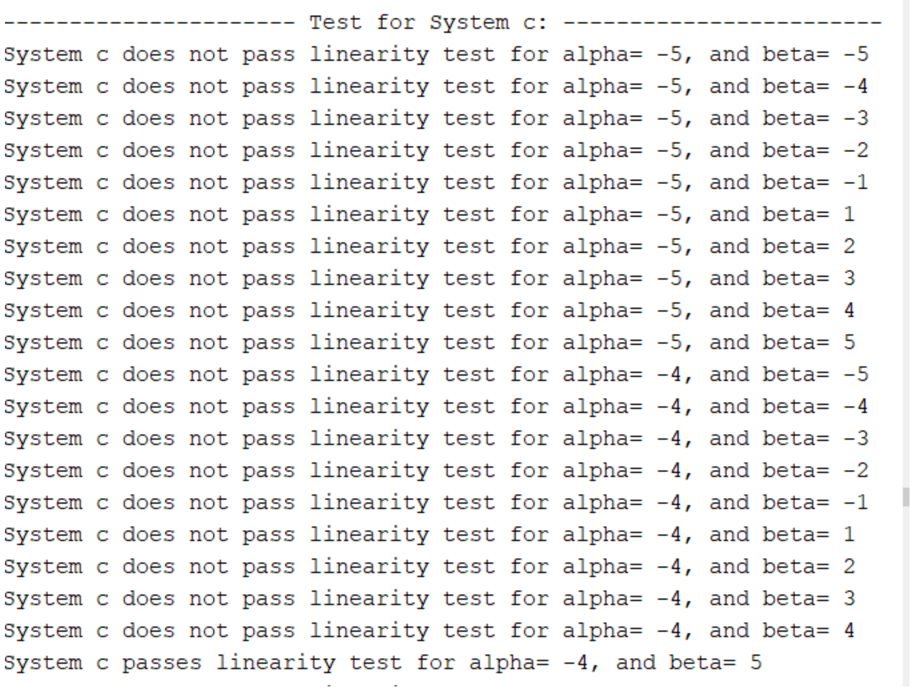
Again for system b, it can be concluded that the system is linear since both experimental results support the theoretical analysis.

Unlike first two systems, system c could not pass all the tests but for each input set it only passed the test for alpha-beta value pairs of {-4, 5}, {-3, 4}, {-2, 3}, {-1, 2}, {2, -1}, {3, -2}, {4, -3} and {5, -4}.



```
---------------------- Test for System c: -----------------------
System c does not pass linearity test for alpha= -5, and beta= -5
System c does not pass linearity test for alpha= -5, and beta= -4
System c does not pass linearity test for alpha= -5, and beta= -3
System c does not pass linearity test for alpha= -5, and beta= -2
System c does not pass linearity test for alpha= -5, and beta= -1
System c does not pass linearity test for alpha= -5, and beta= 1
System c does not pass linearity test for alpha= -5, and beta= 2
System c does not pass linearity test for alpha= -5, and beta= 3
System c does not pass linearity test for alpha= -5, and beta= 4
System c does not pass linearity test for alpha= -5, and beta= 5
System c does not pass linearity test for alpha= -4, and beta= -5
System c does not pass linearity test for alpha= -4, and beta= -4
System c does not pass linearity test for alpha= -4, and beta= -3
System c does not pass linearity test for alpha= -4, and beta= -2
System c does not pass linearity test for alpha= -4, and beta= -1
System c does not pass linearity test for alpha= -4, and beta= 1
System c does not pass linearity test for alpha= -4, and beta= 2
System c does not pass linearity test for alpha= -4, and beta= 3
System c does not pass linearity test for alpha= -4, and beta= 4
System c passes linearity test for alpha= -4, and beta= 5
```

(Figure 6: Linearity test results for System c with input set 1)

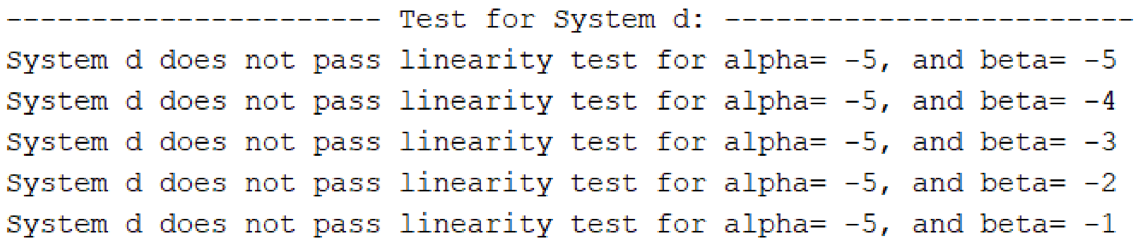


```
---------------------- Test for System c: -----------------------
System c does not pass linearity test for alpha= -5, and beta= -5
System c does not pass linearity test for alpha= -5, and beta= -4
System c does not pass linearity test for alpha= -5, and beta= -3
System c does not pass linearity test for alpha= -5, and beta= -2
System c does not pass linearity test for alpha= -5, and beta= -1
System c does not pass linearity test for alpha= -5, and beta= 1
System c does not pass linearity test for alpha= -5, and beta= 2
System c does not pass linearity test for alpha= -5, and beta= 3
System c does not pass linearity test for alpha= -5, and beta= 4
System c does not pass linearity test for alpha= -5, and beta= 5
System c does not pass linearity test for alpha= -4, and beta= -5
System c does not pass linearity test for alpha= -4, and beta= -4
System c does not pass linearity test for alpha= -4, and beta= -3
System c does not pass linearity test for alpha= -4, and beta= -2
System c does not pass linearity test for alpha= -4, and beta= -1
System c does not pass linearity test for alpha= -4, and beta= 1
System c does not pass linearity test for alpha= -4, and beta= 2
System c does not pass linearity test for alpha= -4, and beta= 3
System c does not pass linearity test for alpha= -4, and beta= 4
System c passes linearity test for alpha= -4, and beta= 5
```

(Figure 7: Linearity test results for System c with input set 2)

Since this system could not pass the test for each combination, it can be said that experimental results support theoretical analysis and system c is not a linear system.

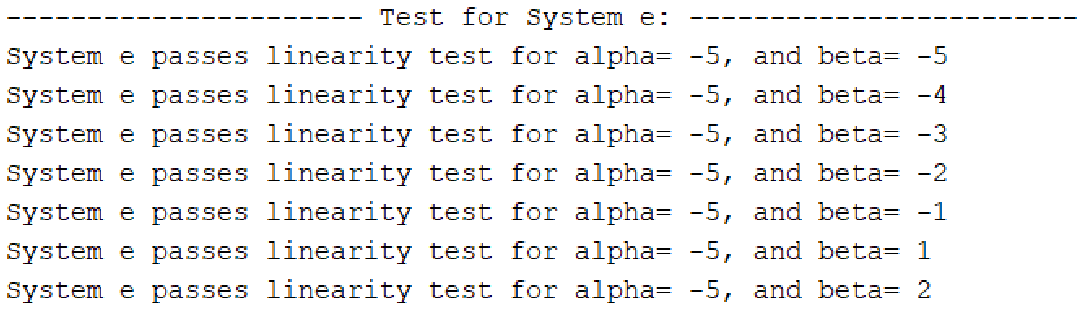
System d does not pass any of the tests for each input set, hence it can be concluded that system d is not linear as it was found in the theory part.



```
---------------------- Test for System d: ------------------------
System d does not pass linearity test for alpha= -5, and beta= -5
System d does not pass linearity test for alpha= -5, and beta= -4
System d does not pass linearity test for alpha= -5, and beta= -3
System d does not pass linearity test for alpha= -5, and beta= -2
System d does not pass linearity test for alpha= -5, and beta= -1
```

(Figure 8: Linearity test results for System d with input set 1)

As it was found in the theoretical part, system e passes the linearity test for each combination.



```
---------------------- Test for System e: ------------------------
System e passes linearity test for alpha= -5, and beta= -5
System e passes linearity test for alpha= -5, and beta= -4
System e passes linearity test for alpha= -5, and beta= -3
System e passes linearity test for alpha= -5, and beta= -2
System e passes linearity test for alpha= -5, and beta= -1
System e passes linearity test for alpha= -5, and beta= 1
System e passes linearity test for alpha= -5, and beta= 2
```

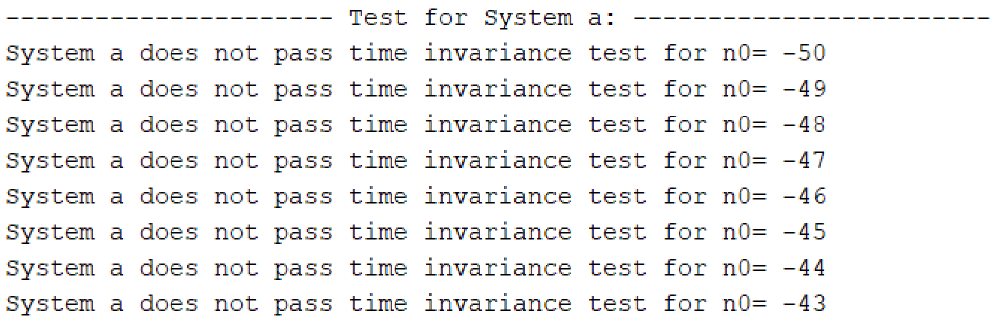
(Figure 9: Linearity test results for System e with input set 1)

To conclude, as in discussed in part 1, systems a, b and e are linear whereas c and d not. The complete output for this past can be found in the output of tests part of this report.

Part 3)

For this part I have extended input sequences as much as the range of delay interval, that is, I have appended 50 zeros to both sides of the input sequences. After that I have run the test procedure 100 times for each system.

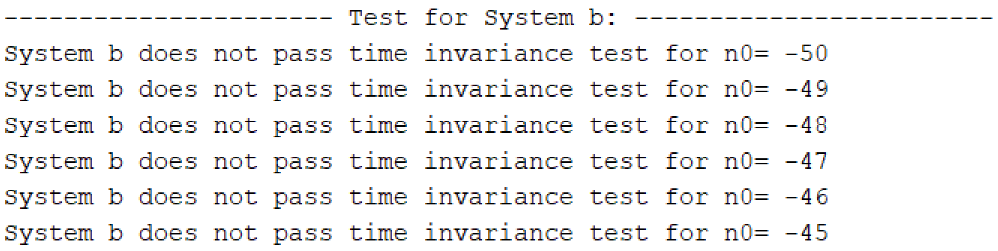
System a could not pass the tests for any of the delay values. As it was concluded in the theoretical part. Therefore System a is time variant.



```
---------------------- Test for System a: ------------------------
System a does not pass time invariance test for n0= -50
System a does not pass time invariance test for n0= -49
System a does not pass time invariance test for n0= -48
System a does not pass time invariance test for n0= -47
System a does not pass time invariance test for n0= -46
System a does not pass time invariance test for n0= -45
System a does not pass time invariance test for n0= -44
System a does not pass time invariance test for n0= -43
```

(Figure 10: Time invariance test results for System a with input set 1)

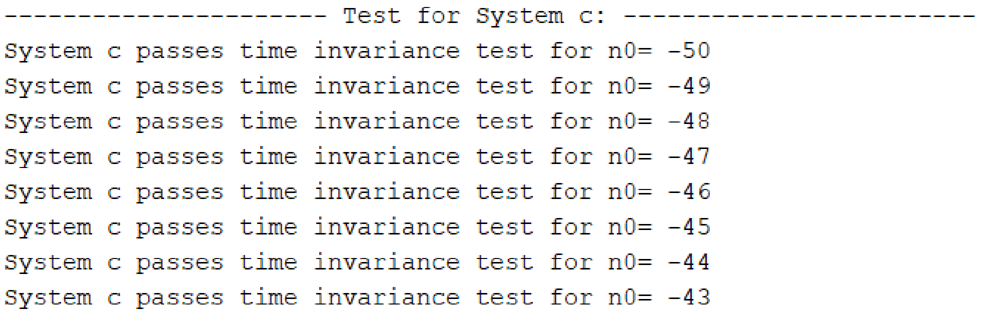
System b also could not pass the tests for any of the delay values and any of the input sequences. This result complies with the theoretical analysis, hence system b is time variant.



```
---------------------- Test for System b: ------------------------
System b does not pass time invariance test for n0= -50
System b does not pass time invariance test for n0= -49
System b does not pass time invariance test for n0= -48
System b does not pass time invariance test for n0= -47
System b does not pass time invariance test for n0= -46
System b does not pass time invariance test for n0= -45
```

(Figure 11: Time invariance test results for System b with input set 1)

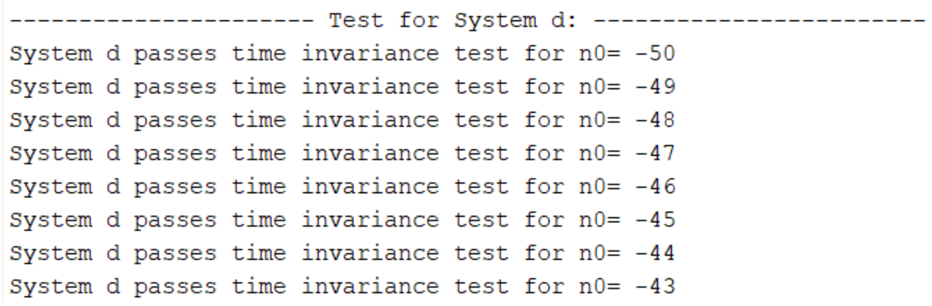
For system c, while delaying I have shifted and added 5s instead of 0s since this system never gets 0 because of the system was shifted 5 in the y axis. Moreover, system c passed all of the tests. This result also complies with theoretical values and it can be concluded that system c is time invariant.



```
---------------------- Test for System c: ------------------------
System c passes time invariance test for n0= -50
System c passes time invariance test for n0= -49
System c passes time invariance test for n0= -48
System c passes time invariance test for n0= -47
System c passes time invariance test for n0= -46
System c passes time invariance test for n0= -45
System c passes time invariance test for n0= -44
System c passes time invariance test for n0= -43
```

(Figure 12: Time invariance test results for System c with input set 1)

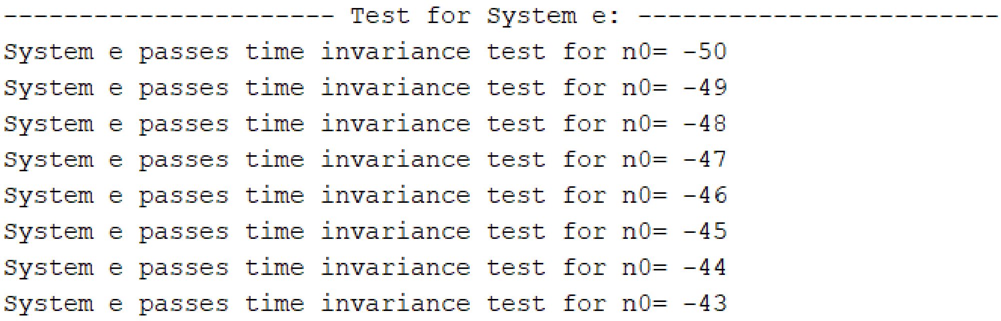
System d also passed all of the tests and it can be concluded system d is time invariant and results also complies with theory.



```
---------------------- Test for System d: ------------------------
System d passes time invariance test for n0= -50
System d passes time invariance test for n0= -49
System d passes time invariance test for n0= -48
System d passes time invariance test for n0= -47
System d passes time invariance test for n0= -46
System d passes time invariance test for n0= -45
System d passes time invariance test for n0= -44
System d passes time invariance test for n0= -43
```

(Figure 13: Time invariance test results for System d with input set 1)

For system e when the delay values are negative, I have added the last element of the system while shifting instead of 0. Moreover, system e also passed all the tests and it is time invariant.



```
---------------------- Test for System e: ------------------------
System e passes time invariance test for n0= -50
System e passes time invariance test for n0= -49
System e passes time invariance test for n0= -48
System e passes time invariance test for n0= -47
System e passes time invariance test for n0= -46
System e passes time invariance test for n0= -45
System e passes time invariance test for n0= -44
System e passes time invariance test for n0= -43
```

(Figure 14: Time invariance test results for System e with input set 1)

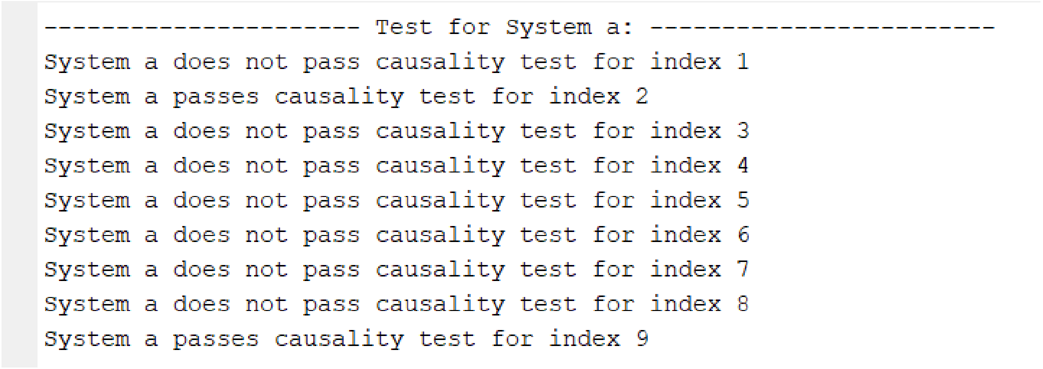
Again full version of the output can be found in Output of Tests part of the report

.

Part 4)

For this part, I have tested each of the systems index by index. For one system I have kept the future values, and for the other I have made future values 0 to see if the future values have effect on the current value. Moreover, I have not tested the systems for final element since it would pass the system anyway since there is no future values left.

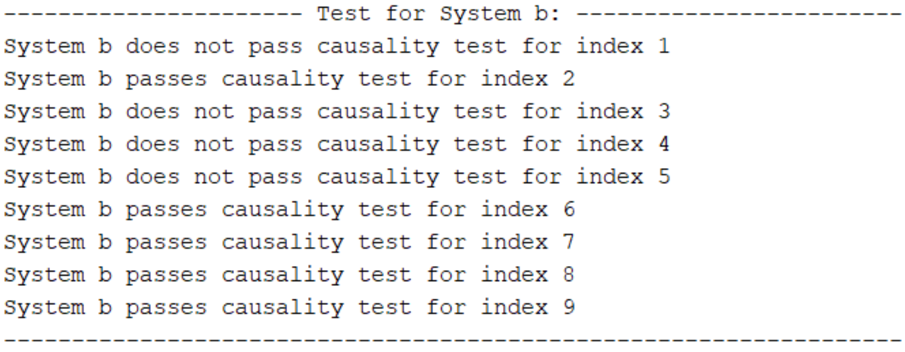
System a only passed the tests for index 2 and 9 but failed others. As I indicated in part 1, the system is not causal.



```
---------------------- Test for System a: ------------------------
System a does not pass causality test for index 1
System a passes causality test for index 2
System a does not pass causality test for index 3
System a does not pass causality test for index 4
System a does not pass causality test for index 5
System a does not pass causality test for index 6
System a does not pass causality test for index 7
System a does not pass causality test for index 8
System a passes causality test for index 9
```

(Figure 15: Causality test results for System a)

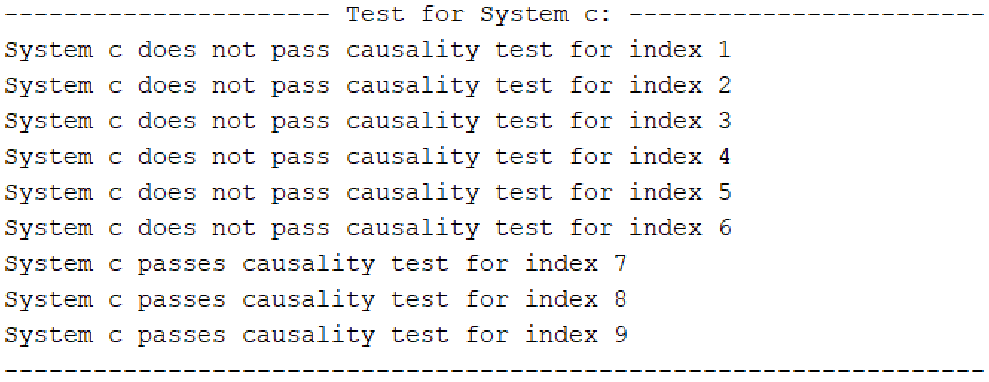
System b passed the tests for 4 indices but it failed 5 of them. As concluded in theoretical part, this system also is not causal.



```
---------------------- Test for System b: ------------------------
System b does not pass causality test for index 1
System b passes causality test for index 2
System b does not pass causality test for index 3
System b does not pass causality test for index 4
System b does not pass causality test for index 5
System b passes causality test for index 6
System b passes causality test for index 7
System b passes causality test for index 8
System b passes causality test for index 9
------------------------------------------------------------------
```

(Figure 16: Causality test results for System b)

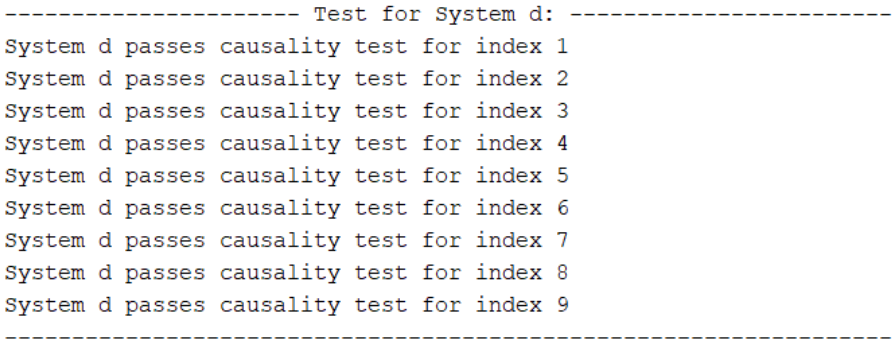
System c only passed the last 3 tests and failed first 6, hence this system is also not causal.



```
---------------------- Test for System c: ------------------------
System c does not pass causality test for index 1
System c does not pass causality test for index 2
System c does not pass causality test for index 3
System c does not pass causality test for index 4
System c does not pass causality test for index 5
System c does not pass causality test for index 6
System c passes causality test for index 7
System c passes causality test for index 8
System c passes causality test for index 9
------------------------------------------------------------------
```

(Figure 17: Causality test results for System c)

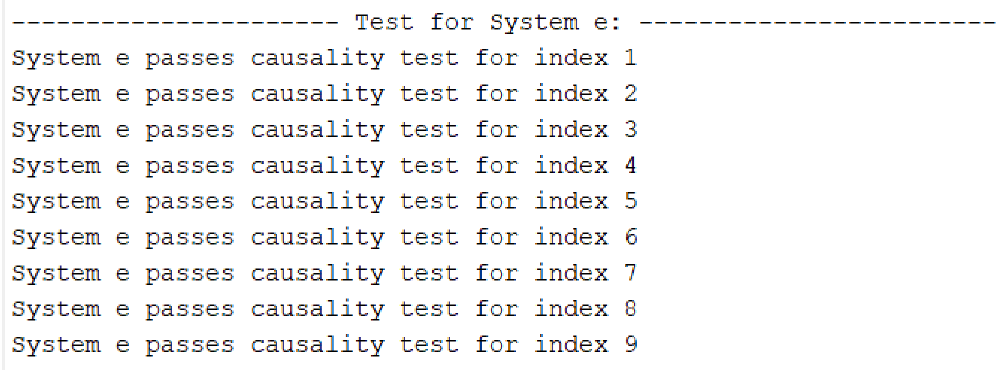
As discussed in the theoretical analysis system d does not use any future values, and tests also proved this. System d passed all of the tests and it is causal.



```
---------------------- Test for System d: ------------------------
System d passes causality test for index 1
System d passes causality test for index 2
System d passes causality test for index 3
System d passes causality test for index 4
System d passes causality test for index 5
System d passes causality test for index 6
System d passes causality test for index 7
System d passes causality test for index 8
System d passes causality test for index 9
------------------------------------------------------------------
```

(Figure 18: Causality test results for System d)

Similarly system e passed all of the tests and it is proven that system e is causal too.



```
---------------------- Test for System e: ------------------------
System e passes causality test for index 1
System e passes causality test for index 2
System e passes causality test for index 3
System e passes causality test for index 4
System e passes causality test for index 5
System e passes causality test for index 6
System e passes causality test for index 7
System e passes causality test for index 8
System e passes causality test for index 9
```

(Figure 19: Causality test results for System e)

MATLAB Code:

Code for System (a) : y[n] = nx[n + 2]

```
%% Author: Berk Saltuk Yılmaz
%%% System a

function [ output_args ] = system_a( input_args, mult )

%%% Get an input signal and advance it by 2 samples
output_args = input_args;
advance = 2;

output_args(1 : end-advance) = input_args(advance + 1: end);
output_args(end - advance + 1: end) = zeros(1, advance);

output_args = mult.*output_args; %% Multiply the system with n

end
```

Code for System (b) : y[n] = x[2n]

```
%% Author: Berk Saltuk Yılmaz
%%% System b

function [ output_args ] = system_b( input_args, len)

output_args = input_args;

    output_args(1 : end/2) = input_args(2:2:len);
    output_args((end/2)+1:end) = zeros(1, len/2);

end
```

Code for System (c) : y[n] = 3x[n + 4] + 5

```
%% Author: Berk Saltuk Yılmaz
%%% System c
function [ output_args ] = system_c( input_args)

%%% Get an input signal and advance it by 2 samples
output_args = input_args;
advance = 4;

output_args(1 : end-advance) = input_args(advance + 1: end);
output_args(end - advance + 1: end) = zeros(1, advance);

output_args = 3.*output_args + 5; %% Multiply the system with n

end
```

Code for System (d) : y[n] = | x[n] |

```
%% Author: Berk Saltuk Yılmaz
%%% System d
function [ output_args ] = system_d( input_args)

output_args = abs(input_args);
```

```

end
```

Code for System (e) : y[n] = $\sum_{k=1}^{n}$ x[k]

```
%% Author: Berk Saltuk Yılmaz
%%% System e
function [ output_args ] = system_e( input_args, n)

output_args = input_args;

sum = 0;
for index = n
    for inner = 1:index
        sum = sum + input_args(inner);
    end
    output_args(index) = sum;
    sum = 0;
end

end
```

Code for Linearity Test (Part 2)

```
%% Author: Berk Saltuk Yılmaz
%%% Code for testing linearity
clc;
clear;

%%% Input index is same with the example test
n=1:10;

%%% Constants
alpha = -5:5;
beta = -5:5;

fprintf("-------------------- TESTS WITH INPUT SET #1 ---------------------\n");

%%% Test first run
% Input set #1
x1 = [-3 -4 2 0 1 4 3 6 3 7];
x2 = [2 5 -1 7 -3 6 12 -9 8 -4];

fprintf("---------------------- Test for System a: -----------------------\n");

% Test for System a
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
            y1_a = system_a(x1, n);
            y2_a = system_a(x2, n);
            w_a = ind.*y1_a + jind.*y2_a;

            x_a = ind.*x1 + jind.*x2;
            y_a = system_a(x_a, n);
            if(isequal(w_a,y_a))
                fprintf('System a passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
            else
                fprintf('System a does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
            end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System b: ------------------------\n");
% Test for System b
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_b = system_b(x1, 10);
        y2_b = system_b(x2, 10);
        w_b = ind.*y1_b + jind.*y2_b;

        x_b = ind.*x1 + jind.*x2;
        y_b = system_b(x_b,10);
        if(isequal(w_b,y_b))
            fprintf('System b passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System b does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System c: ------------------------\n");
% Test for System c
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_c = system_c(x1);
        y2_c = system_c(x2);
        w_c = ind.*y1_c + jind.*y2_c;

        x_c = ind.*x1 + jind.*x2;
        y_c = system_c(x_c);
        if(isequal(w_c,y_c))
            fprintf('System c passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System c does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System d: ------------------------\n");
% Test for System d
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_d = system_d(x1);
        y2_d = system_d(x2);
        w_d = ind.*y1_d + jind.*y2_d;

        x_d = ind.*x1 + jind.*x2;
        y_d = system_d(x_d);
        if(isequal(w_d,y_d))
            fprintf('System d passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System d does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System e: ------------------------\n");
% Test for System e
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_e = system_e(x1, n);
        y2_e = system_e(x2, n);
        w_e = ind.*y1_e + jind.*y2_e;

        x_e = ind.*x1 + jind.*x2;
        y_e = system_e(x_e, n);
        if(isequal(w_e,y_e))
            fprintf('System e passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System e does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("-------------------- TESTS WITH INPUT SET #2 ---------------------\n");
% Tests second run
% Input set #2
x1 =  [9 23 15 -10 18 14 5 -1 6 11];
x2 = [2 5 -1 7 -3 6 12 -9 8 -4];

fprintf("---------------------- Test for System a: ------------------------\n");

% Test for System a
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_a = system_a(x1, n);
        y2_a = system_a(x2, n);
        w_a = ind.*y1_a + jind.*y2_a;

        x_a = ind.*x1 + jind.*x2;
        y_a = system_a(x_a, n);
        if(isequal(w_a,y_a))
            fprintf('System a passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System a does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end
```

```
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System b: ------------------------\n");
% Test for System b
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_b = system_b(x1, 10);
        y2_b = system_b(x2, 10);
        w_b = ind.*y1_b + jind.*y2_b;

        x_b = ind.*x1 + jind.*x2;
        y_b = system_b(x_b, 10);
        if(isequal(w_b,y_b))
            fprintf('System b passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System b does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System c: ------------------------\n");
% Test for System c
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_c = system_c(x1);
        y2_c = system_c(x2);
        w_c = ind.*y1_c + jind.*y2_c;

        x_c = ind.*x1 + jind.*x2;
        y_c = system_c(x_c);
        if(isequal(w_c,y_c))
            fprintf('System c passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System c does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System d: ------------------------\n");
% Test for System d
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_d = system_d(x1);
        y2_d = system_d(x2);
        w_d = ind.*y1_d + jind.*y2_d;

        x_d = ind.*x1 + jind.*x2;
        y_d = system_d(x_d);
        if(isequal(w_d,y_d))
            fprintf('System d passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System d does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end

fprintf("-----------------------------------------------------------------\n");

fprintf("---------------------- Test for System e: -----------------------\n");
% Test for System e
for ind = alpha
    for jind = beta
        if( ind ~= 0 && jind ~= 0)
        y1_e = system_e(x1, n);
        y2_e = system_e(x2, n);
        w_e = ind.*y1_e + jind.*y2_e;

        x_e = ind.*x1 + jind.*x2;
        y_e = system_e(x_e, n);
        if(isequal(w_e,y_e))
            fprintf('System e passes linearity test for alpha= %d, and beta= %d\n', ind, jind);
        else
            fprintf('System e does not pass linearity test for alpha= %d, and beta= %d\n', ind,
jind);
        end
        end
    end
end
```

Code for Time Invariance Test (Part 3)

```
%% Author: Berk Saltuk Yılmaz
%%% Code for testing time invariance
clc;
clear;

n0 = -50:50; % Delay gets the values from -50 to 50
%%% Test sequence #1
fprintf("-------------------- TESTS WITH INPUT #1 ---------------------\n");
x = [-3 -4 2 0 1 4 3 6 3 7];
x_extended(1:50) = zeros(1,50);
x_extended(51:60) = x;
x_extended(61:110) = zeros(1,50);
x = x_extended;
n = 1:110;
fprintf("---------------------- Test for System a: -----------------------\n");
% Test for a
for ind = n0
   if(ind ~= 0)
    y_a = system_a(x, n);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_a_delayed = zeros(1, length(y_a));
        y_a_delayed(ind+1: length(y_a)) = y_a(1:length(y_a)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));

        y_a_delayed = zeros(1, length(y_a));
        y_a_delayed(1:length(y_a) + ind) = y_a(-ind+1:length(y_a));
    end
    w_a = system_a(x_delayed, n);
    if(isequal(w_a,y_a_delayed))
        fprintf('System a passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System a does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System b: ------------------------\n");
% Test for b
for ind = n0
   if(ind ~= 0)
    y_b = system_b(x, 110);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_b_delayed = zeros(1, length(y_b));
        y_b_delayed(ind+1: length(y_b)) = y_b(1:length(y_b)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_b_delayed = zeros(1, length(y_b));
        y_b_delayed(1:length(y_b) + ind) = y_b(-ind+1:length(y_b));
    end
    w_b = system_b(x_delayed, 110);
    if(isequal(w_b,y_b_delayed))
        fprintf('System b passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System b does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System c: ------------------------\n");
% Test for c
for ind = n0
   if(ind ~= 0)
    y_c = system_c(x);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_c_delayed = 5.*ones(1, length(y_c));
        y_c_delayed(ind+1: length(y_c)) = y_c(1:length(y_c)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_c_delayed = 5.*ones(1, length(y_c));
        y_c_delayed(1:length(y_c) + ind) = y_c(-ind+1:length(y_c));
    end
    w_c = system_c(x_delayed);
    if(isequal(w_c,y_c_delayed))
        fprintf('System c passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System c does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
```

```
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System d: ------------------------\n");
% Test for d
for ind = n0
   if(ind ~= 0)
    y_d = system_d(x);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_d_delayed = zeros(1, length(y_d));
        y_d_delayed(ind+1: length(y_d)) = y_d(1:length(y_d)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_d_delayed = zeros(1, length(y_d));
        y_d_delayed(1:length(y_d) + ind) = y_d(-ind+1:length(y_d));
    end
    w_d = system_d(x_delayed);
    if(isequal(w_d,y_d_delayed))
        fprintf('System d passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System d does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System e: ------------------------\n");
% Test for e
for ind = n0
   if(ind ~= 0)
    y_e = system_e(x, n);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_e_delayed = zeros(1, length(y_e));
        y_e_delayed(ind+1: length(y_e)) = y_e(1:length(y_e)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_e_delayed = y_e(end-1).*ones(1, length(y_e));
        y_e_delayed(1:length(y_e) + ind) = y_e(-ind+1:length(y_e));
    end
    w_e = system_e(x_delayed, n);
    if(isequal(w_e,y_e_delayed))
        fprintf('System e passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System e does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("-------------------- TESTS WITH INPUT #2 ---------------------\n");
%%% Test sequence #2
x = [5 -11 9 2 3 -6 0 -7 3 10];
x_extended(1:50) = zeros(1,50);
x_extended(51:60) = x;
x_extended(61:110) = zeros(1,50);
x = x_extended;
```

```
fprintf("---------------------- Test for System a: ------------------------\n");
for ind = n0
   if(ind ~= 0)
    y_a = system_a(x, n);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_a_delayed = zeros(1, length(y_a));
        y_a_delayed(ind+1: length(y_a)) = y_a(1:length(y_a)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_a_delayed = zeros(1, length(y_a));
        y_a_delayed(1:length(y_a) + ind) = y_a(-ind+1:length(y_a));
    end
    w_a = system_a(x_delayed, n);
    if(isequal(w_a,y_a_delayed))
        fprintf('System a passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System a does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System b: ------------------------\n");
for ind = n0
   if(ind ~= 0)
    y_b = system_b(x, 110);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_b_delayed = zeros(1, length(y_b));
        y_b_delayed(ind+1: length(y_b)) = y_b(1:length(y_b)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_b_delayed = zeros(1, length(y_b));
        y_b_delayed(1:length(y_b) + ind) = y_b(-ind+1:length(y_b));
    end
    w_b = system_b(x_delayed, 110);
    if(isequal(w_b,y_b_delayed))
        fprintf('System b passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System b does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System c: ------------------------\n");
for ind = n0
   if(ind ~= 0)
    y_c = system_c(x);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_c_delayed = 5.*ones(1, length(y_c));
        y_c_delayed(ind+1: length(y_c)) = y_c(1:length(y_c)-ind);
    else
```

```
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_c_delayed = 5.*ones(1, length(y_c));
        y_c_delayed(1:length(y_c) + ind) = y_c(-ind+1:length(y_c));
    end
    w_c = system_c(x_delayed);
    if(isequal(w_c,y_c_delayed))
        fprintf('System c passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System c does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System d: ------------------------\n");
for ind = n0
   if(ind ~= 0)
    y_d = system_d(x);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_d_delayed = zeros(1, length(y_d));
        y_d_delayed(ind+1: length(y_d)) = y_d(1:length(y_d)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_d_delayed = zeros(1, length(y_d));
        y_d_delayed(1:length(y_d) + ind) = y_d(-ind+1:length(y_d));
    end
    w_d = system_d(x_delayed);
    if(isequal(w_d,y_d_delayed))
        fprintf('System d passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System d does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System e: ------------------------\n");
for ind = n0
   if(ind ~= 0)
    y_e = system_e(x, n);
    if(ind>0)
        x_delayed = zeros(1, length(x));
        x_delayed(ind+1:length(x)) = x(1:length(x)-ind);

        y_e_delayed = zeros(1, length(y_e));
        y_e_delayed(ind+1: length(y_e)) = y_e(1:length(y_e)-ind);
    else
        x_delayed = zeros(1,length(x));
        x_delayed(1:length(x)+ ind) = x(-ind+1:length(x));
        y_e_delayed = y_e(end-1).*ones(1, length(y_e));
        y_e_delayed(1:length(y_e) + ind) = y_e(-ind+1:length(y_e));
    end
    w_e = system_e(x_delayed, n);
    if(isequal(w_e,y_e_delayed))
        fprintf('System e passes time invariance test for n0= %d\n' ,ind);
    else
        fprintf('System e does not pass time invariance test for n0= %d\n', ind);
    end
   end
end
```

Code for Causality Test (Part 4)

```
%% Author: Berk Saltuk Yılmaz
%%% Code for testing causality
clc;
clear;

%%% Input index is same with the example test
n=1:9;

x = [-3 -4 2 0 1 4 3 6 3 7];
z = x;
z1 = z;
z2 = z;
fprintf("--------------------- Test for System a: -----------------------\n");
for ind = n
    z2(1:ind) = z(1:ind);
    z2(ind+1:end) = zeros(1, length(z2)-ind);

    w_a = system_a(z1,10);
    y_a = system_a(z2, 10);
    if(w_a(ind) == y_a(ind))
        disp("System a passes causality test for index " + ind);
    else
        disp("System a does not pass causality test for index " + ind);
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("--------------------- Test for System b: -----------------------\n");
z1 = z;
z2 = z;
for ind = n
    z2(1:ind) = z(1:ind);
    z2(ind+1:end) = zeros(1, length(z2)-ind);

    w_b = system_b(z1,10);
    y_b = system_b(z2, 10);
    if(w_b(ind) == y_b(ind))
        disp("System b passes causality test for index " + ind);
    else
        disp("System b does not pass causality test for index " + ind);
    end
end

fprintf("------------------------------------------------------------------\n");

fprintf("--------------------- Test for System c: -----------------------\n");
z1 = z;
z2 = z;
for ind = n
    z2(1:ind) = z(1:ind);
    z2(ind+1:end) = zeros(1, length(z2)-ind);

    w_c = system_c(z1);
    y_c = system_c(z2);
    if(w_c(ind) == y_c(ind))
        disp("System c passes causality test for index " + ind);
    else
        disp("System c does not pass causality test for index " + ind);
    end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System d: ------------------------\n");
z1 = z;
z2 = z;
for ind = n
    z2(1:ind) = z(1:ind);
    z2(ind+1:end) = zeros(1, length(z2)-ind);

    w_d = system_d(z1);
    y_d = system_d(z2);
    if(w_d(ind) == y_d(ind))
        disp("System d passes causality test for index " + ind);
    else
        disp("System d does not pass causality test for index " + ind);
    end
end
fprintf("------------------------------------------------------------------\n");

fprintf("---------------------- Test for System e: ------------------------\n");
z1 = z;
z2 = z;
for ind = n
    z2(1:ind) = z(1:ind);
    z2(ind+1:end) = zeros(1, length(z2)-ind);

    w_e = system_d(z1);
    y_e = system_d(z2);
    if(w_e(ind) == y_e(ind))
        disp("System e passes causality test for index " + ind);
    else
        disp("System e does not pass causality test for index " + ind);
    end
end
```

Outputs of Tests

Output of Linearity Test

```
------------------- TESTS WITH INPUT SET #1 --------------------
--------------------- Test for System a: -----------------------
System a passes linearity test for alpha= -5, and beta= -5
System a passes linearity test for alpha= -5, and beta= -4
System a passes linearity test for alpha= -5, and beta= -3
System a passes linearity test for alpha= -5, and beta= -2
System a passes linearity test for alpha= -5, and beta= -1
System a passes linearity test for alpha= -5, and beta= 1
System a passes linearity test for alpha= -5, and beta= 2
System a passes linearity test for alpha= -5, and beta= 3
System a passes linearity test for alpha= -5, and beta= 4
System a passes linearity test for alpha= -5, and beta= 5
System a passes linearity test for alpha= -4, and beta= -5
System a passes linearity test for alpha= -4, and beta= -4
System a passes linearity test for alpha= -4, and beta= -3
System a passes linearity test for alpha= -4, and beta= -2
System a passes linearity test for alpha= -4, and beta= -1
System a passes linearity test for alpha= -4, and beta= 1
System a passes linearity test for alpha= -4, and beta= 2
System a passes linearity test for alpha= -4, and beta= 3
System a passes linearity test for alpha= -4, and beta= 4
System a passes linearity test for alpha= -4, and beta= 5
System a passes linearity test for alpha= -3, and beta= -5
System a passes linearity test for alpha= -3, and beta= -4
System a passes linearity test for alpha= -3, and beta= -3
System a passes linearity test for alpha= -3, and beta= -2
System a passes linearity test for alpha= -3, and beta= -1
System a passes linearity test for alpha= -3, and beta= 1
System a passes linearity test for alpha= -3, and beta= 2
System a passes linearity test for alpha= -3, and beta= 3
System a passes linearity test for alpha= -3, and beta= 4
System a passes linearity test for alpha= -3, and beta= 5
System a passes linearity test for alpha= -2, and beta= -5
System a passes linearity test for alpha= -2, and beta= -4
System a passes linearity test for alpha= -2, and beta= -3
System a passes linearity test for alpha= -2, and beta= -2
System a passes linearity test for alpha= -2, and beta= -1
System a passes linearity test for alpha= -2, and beta= 1
System a passes linearity test for alpha= -2, and beta= 2
System a passes linearity test for alpha= -2, and beta= 3
System a passes linearity test for alpha= -2, and beta= 4
System a passes linearity test for alpha= -2, and beta= 5
System a passes linearity test for alpha= -1, and beta= -5
System a passes linearity test for alpha= -1, and beta= -4
System a passes linearity test for alpha= -1, and beta= -3
System a passes linearity test for alpha= -1, and beta= -2
System a passes linearity test for alpha= -1, and beta= -1
System a passes linearity test for alpha= -1, and beta= 1
System a passes linearity test for alpha= -1, and beta= 2
System a passes linearity test for alpha= -1, and beta= 3
System a passes linearity test for alpha= -1, and beta= 4
System a passes linearity test for alpha= -1, and beta= 5
System a passes linearity test for alpha= 1, and beta= -5
System a passes linearity test for alpha= 1, and beta= -4
System a passes linearity test for alpha= 1, and beta= -3
System a passes linearity test for alpha= 1, and beta= -2
System a passes linearity test for alpha= 1, and beta= -1
System a passes linearity test for alpha= 1, and beta= 1
System a passes linearity test for alpha= 1, and beta= 2
System a passes linearity test for alpha= 1, and beta= 3
System a passes linearity test for alpha= 1, and beta= 4
System a passes linearity test for alpha= 1, and beta= 5
System a passes linearity test for alpha= 2, and beta= -5
System a passes linearity test for alpha= 2, and beta= -4
System a passes linearity test for alpha= 2, and beta= -3
System a passes linearity test for alpha= 2, and beta= -2
System a passes linearity test for alpha= 2, and beta= -1
System a passes linearity test for alpha= 2, and beta= 1
System a passes linearity test for alpha= 2, and beta= 2
System a passes linearity test for alpha= 2, and beta= 3
System a passes linearity test for alpha= 2, and beta= 4
System a passes linearity test for alpha= 2, and beta= 5
System a passes linearity test for alpha= 3, and beta= -5
System a passes linearity test for alpha= 3, and beta= -4
System a passes linearity test for alpha= 3, and beta= -3
System a passes linearity test for alpha= 3, and beta= -2
System a passes linearity test for alpha= 3, and beta= -1
System a passes linearity test for alpha= 3, and beta= 1
System a passes linearity test for alpha= 3, and beta= 2
System a passes linearity test for alpha= 3, and beta= 3
System a passes linearity test for alpha= 3, and beta= 4
System a passes linearity test for alpha= 3, and beta= 5
System a passes linearity test for alpha= 4, and beta= -5
System a passes linearity test for alpha= 4, and beta= -4
System a passes linearity test for alpha= 4, and beta= -3
System a passes linearity test for alpha= 4, and beta= -2
System a passes linearity test for alpha= 4, and beta= -1
System a passes linearity test for alpha= 4, and beta= 1
System a passes linearity test for alpha= 4, and beta= 2
System a passes linearity test for alpha= 4, and beta= 3
System a passes linearity test for alpha= 4, and beta= 4
System a passes linearity test for alpha= 4, and beta= 5
System a passes linearity test for alpha= 5, and beta= -5
System a passes linearity test for alpha= 5, and beta= -4
System a passes linearity test for alpha= 5, and beta= -3
System a passes linearity test for alpha= 5, and beta= -2
System a passes linearity test for alpha= 5, and beta= -1
System a passes linearity test for alpha= 5, and beta= 1
System a passes linearity test for alpha= 5, and beta= 2
System a passes linearity test for alpha= 5, and beta= 3
System a passes linearity test for alpha= 5, and beta= 4
System a passes linearity test for alpha= 5, and beta= 5
------------------------------------------------------------------
--------------------- Test for System b: -------------------------
System b passes linearity test for alpha= -5, and beta= -5
System b passes linearity test for alpha= -5, and beta= -4
System b passes linearity test for alpha= -5, and beta= -3
System b passes linearity test for alpha= -5, and beta= -2
System b passes linearity test for alpha= -5, and beta= -1
System b passes linearity test for alpha= -5, and beta= 1
System b passes linearity test for alpha= -5, and beta= 2
System b passes linearity test for alpha= -5, and beta= 3
System b passes linearity test for alpha= -5, and beta= 4
System b passes linearity test for alpha= -5, and beta= 5
System b passes linearity test for alpha= -4, and beta= -5
System b passes linearity test for alpha= -4, and beta= -4
System b passes linearity test for alpha= -4, and beta= -3
System b passes linearity test for alpha= -4, and beta= -2
System b passes linearity test for alpha= -4, and beta= -1
System b passes linearity test for alpha= -4, and beta= 1
System b passes linearity test for alpha= -4, and beta= 2
System b passes linearity test for alpha= -4, and beta= 3
System b passes linearity test for alpha= -4, and beta= 4
System b passes linearity test for alpha= -4, and beta= 5
System b passes linearity test for alpha= -3, and beta= -5
System b passes linearity test for alpha= -3, and beta= -4
System b passes linearity test for alpha= -3, and beta= -3
System b passes linearity test for alpha= -3, and beta= -2
System b passes linearity test for alpha= -3, and beta= -1
System b passes linearity test for alpha= -3, and beta= 1
System b passes linearity test for alpha= -3, and beta= 2
System b passes linearity test for alpha= -3, and beta= 3
System b passes linearity test for alpha= -3, and beta= 4
System b passes linearity test for alpha= -3, and beta= 5
System b passes linearity test for alpha= -2, and beta= -5
System b passes linearity test for alpha= -2, and beta= -4
System b passes linearity test for alpha= -2, and beta= -3
System b passes linearity test for alpha= -2, and beta= -2
System b passes linearity test for alpha= -2, and beta= -1
System b passes linearity test for alpha= -2, and beta= 1
System b passes linearity test for alpha= -2, and beta= 2
System b passes linearity test for alpha= -2, and beta= 3
System b passes linearity test for alpha= -2, and beta= 4
System b passes linearity test for alpha= -2, and beta= 5
System b passes linearity test for alpha= -1, and beta= -5
System b passes linearity test for alpha= -1, and beta= -4
System b passes linearity test for alpha= -1, and beta= -3
System b passes linearity test for alpha= -1, and beta= -2
System b passes linearity test for alpha= -1, and beta= -1
System b passes linearity test for alpha= -1, and beta= 1
System b passes linearity test for alpha= -1, and beta= 2
System b passes linearity test for alpha= -1, and beta= 3
System b passes linearity test for alpha= -1, and beta= 4
System b passes linearity test for alpha= -1, and beta= 5
System b passes linearity test for alpha= 1, and beta= -5
System b passes linearity test for alpha= 1, and beta= -4
System b passes linearity test for alpha= 1, and beta= -3
System b passes linearity test for alpha= 1, and beta= -2
System b passes linearity test for alpha= 1, and beta= -1
System b passes linearity test for alpha= 1, and beta= 1
System b passes linearity test for alpha= 1, and beta= 2
System b passes linearity test for alpha= 1, and beta= 3
System b passes linearity test for alpha= 1, and beta= 4
System b passes linearity test for alpha= 1, and beta= 5
System b passes linearity test for alpha= 2, and beta= -5
System b passes linearity test for alpha= 2, and beta= -4
System b passes linearity test for alpha= 2, and beta= -3
System b passes linearity test for alpha= 2, and beta= -2
System b passes linearity test for alpha= 2, and beta= -1
System b passes linearity test for alpha= 2, and beta= 1
System b passes linearity test for alpha= 2, and beta= 2
System b passes linearity test for alpha= 2, and beta= 3
System b passes linearity test for alpha= 2, and beta= 4
System b passes linearity test for alpha= 2, and beta= 5
System b passes linearity test for alpha= 3, and beta= -5
System b passes linearity test for alpha= 3, and beta= -4
System b passes linearity test for alpha= 3, and beta= -3
System b passes linearity test for alpha= 3, and beta= -2
System b passes linearity test for alpha= 3, and beta= -1
System b passes linearity test for alpha= 3, and beta= 1
System b passes linearity test for alpha= 3, and beta= 2
System b passes linearity test for alpha= 3, and beta= 3
System b passes linearity test for alpha= 3, and beta= 4
System b passes linearity test for alpha= 3, and beta= 5
System b passes linearity test for alpha= 4, and beta= -5
System b passes linearity test for alpha= 4, and beta= -4
System b passes linearity test for alpha= 4, and beta= -3
System b passes linearity test for alpha= 4, and beta= -2
System b passes linearity test for alpha= 4, and beta= -1
System b passes linearity test for alpha= 4, and beta= 1
System b passes linearity test for alpha= 4, and beta= 2
System b passes linearity test for alpha= 4, and beta= 3
System b passes linearity test for alpha= 4, and beta= 4
System b passes linearity test for alpha= 4, and beta= 5
System b passes linearity test for alpha= 5, and beta= -5
System b passes linearity test for alpha= 5, and beta= -4
System b passes linearity test for alpha= 5, and beta= -3
System b passes linearity test for alpha= 5, and beta= -2
System b passes linearity test for alpha= 5, and beta= -1
System b passes linearity test for alpha= 5, and beta= 1
System b passes linearity test for alpha= 5, and beta= 2
System b passes linearity test for alpha= 5, and beta= 3
System b passes linearity test for alpha= 5, and beta= 4
System b passes linearity test for alpha= 5, and beta= 5
----------------------------------------------------------------
---------------------- Test for System c: -----------------------
System c does not pass linearity test for alpha= -5, and beta= -5
System c does not pass linearity test for alpha= -5, and beta= -4
System c does not pass linearity test for alpha= -5, and beta= -3
System c does not pass linearity test for alpha= -5, and beta= -2
System c does not pass linearity test for alpha= -5, and beta= -1
System c does not pass linearity test for alpha= -5, and beta= 1
System c does not pass linearity test for alpha= -5, and beta= 2
System c does not pass linearity test for alpha= -5, and beta= 3
System c does not pass linearity test for alpha= -5, and beta= 4
System c does not pass linearity test for alpha= -5, and beta= 5
System c does not pass linearity test for alpha= -4, and beta= -5
System c does not pass linearity test for alpha= -4, and beta= -4
System c does not pass linearity test for alpha= -4, and beta= -3
System c does not pass linearity test for alpha= -4, and beta= -2
System c does not pass linearity test for alpha= -4, and beta= -1
System c does not pass linearity test for alpha= -4, and beta= 1
System c does not pass linearity test for alpha= -4, and beta= 2
System c does not pass linearity test for alpha= -4, and beta= 3
System c does not pass linearity test for alpha= -4, and beta= 4
System c passes linearity test for alpha= -4, and beta= 5
System c does not pass linearity test for alpha= -3, and beta= -5
System c does not pass linearity test for alpha= -3, and beta= -4
System c does not pass linearity test for alpha= -3, and beta= -3
System c does not pass linearity test for alpha= -3, and beta= -2
System c does not pass linearity test for alpha= -3, and beta= -1
System c does not pass linearity test for alpha= -3, and beta= 1
System c does not pass linearity test for alpha= -3, and beta= 2
System c does not pass linearity test for alpha= -3, and beta= 3
System c passes linearity test for alpha= -3, and beta= 4
System c does not pass linearity test for alpha= -3, and beta= 5
System c does not pass linearity test for alpha= -2, and beta= -5
System c does not pass linearity test for alpha= -2, and beta= -4
System c does not pass linearity test for alpha= -2, and beta= -3
System c does not pass linearity test for alpha= -2, and beta= -2
System c does not pass linearity test for alpha= -2, and beta= -1
System c does not pass linearity test for alpha= -2, and beta= 1
System c does not pass linearity test for alpha= -2, and beta= 2
System c passes linearity test for alpha= -2, and beta= 3
System c does not pass linearity test for alpha= -2, and beta= 4
System c does not pass linearity test for alpha= -2, and beta= 5
System c does not pass linearity test for alpha= -1, and beta= -5
System c does not pass linearity test for alpha= -1, and beta= -4
System c does not pass linearity test for alpha= -1, and beta= -3
System c does not pass linearity test for alpha= -1, and beta= -2
System c does not pass linearity test for alpha= -1, and beta= -1
System c does not pass linearity test for alpha= -1, and beta= 1
System c passes linearity test for alpha= -1, and beta= 2
System c does not pass linearity test for alpha= -1, and beta= 3
System c does not pass linearity test for alpha= -1, and beta= 4
System c does not pass linearity test for alpha= -1, and beta= 5
System c does not pass linearity test for alpha= 1, and beta= -5
System c does not pass linearity test for alpha= 1, and beta= -4
System c does not pass linearity test for alpha= 1, and beta= -3
System c does not pass linearity test for alpha= 1, and beta= -2
System c does not pass linearity test for alpha= 1, and beta= -1
System c does not pass linearity test for alpha= 1, and beta= 1
System c does not pass linearity test for alpha= 1, and beta= 2
System c does not pass linearity test for alpha= 1, and beta= 3
System c does not pass linearity test for alpha= 1, and beta= 4
System c does not pass linearity test for alpha= 1, and beta= 5
System c does not pass linearity test for alpha= 2, and beta= -5
System c does not pass linearity test for alpha= 2, and beta= -4
System c does not pass linearity test for alpha= 2, and beta= -3
System c does not pass linearity test for alpha= 2, and beta= -2
System c passes linearity test for alpha= 2, and beta= -1
System c does not pass linearity test for alpha= 2, and beta= 1
System c does not pass linearity test for alpha= 2, and beta= 2
System c does not pass linearity test for alpha= 2, and beta= 3
System c does not pass linearity test for alpha= 2, and beta= 4
System c does not pass linearity test for alpha= 2, and beta= 5
System c does not pass linearity test for alpha= 3, and beta= -5
System c does not pass linearity test for alpha= 3, and beta= -4
System c does not pass linearity test for alpha= 3, and beta= -3
System c passes linearity test for alpha= 3, and beta= -2
System c does not pass linearity test for alpha= 3, and beta= -1
System c does not pass linearity test for alpha= 3, and beta= 1
System c does not pass linearity test for alpha= 3, and beta= 2
System c does not pass linearity test for alpha= 3, and beta= 3
System c does not pass linearity test for alpha= 3, and beta= 4
System c does not pass linearity test for alpha= 3, and beta= 5
System c does not pass linearity test for alpha= 4, and beta= -5
System c does not pass linearity test for alpha= 4, and beta= -4
System c passes linearity test for alpha= 4, and beta= -3
System c does not pass linearity test for alpha= 4, and beta= -2
System c does not pass linearity test for alpha= 4, and beta= -1
System c does not pass linearity test for alpha= 4, and beta= 1
System c does not pass linearity test for alpha= 4, and beta= 2
System c does not pass linearity test for alpha= 4, and beta= 3
System c does not pass linearity test for alpha= 4, and beta= 4
System c does not pass linearity test for alpha= 4, and beta= 5
System c does not pass linearity test for alpha= 5, and beta= -5
System c passes linearity test for alpha= 5, and beta= -4
System c does not pass linearity test for alpha= 5, and beta= -3
System c does not pass linearity test for alpha= 5, and beta= -2
System c does not pass linearity test for alpha= 5, and beta= -1
System c does not pass linearity test for alpha= 5, and beta= 1
System c does not pass linearity test for alpha= 5, and beta= 2
System c does not pass linearity test for alpha= 5, and beta= 3
System c does not pass linearity test for alpha= 5, and beta= 4
System c does not pass linearity test for alpha= 5, and beta= 5
-----------------------------------------------------------------
---------------------- Test for System d: ------------------------
System d does not pass linearity test for alpha= -5, and beta= -5
System d does not pass linearity test for alpha= -5, and beta= -4
System d does not pass linearity test for alpha= -5, and beta= -3
System d does not pass linearity test for alpha= -5, and beta= -2
System d does not pass linearity test for alpha= -5, and beta= -1
System d does not pass linearity test for alpha= -5, and beta= 1
System d does not pass linearity test for alpha= -5, and beta= 2
System d does not pass linearity test for alpha= -5, and beta= 3
System d does not pass linearity test for alpha= -5, and beta= 4
System d does not pass linearity test for alpha= -5, and beta= 5
System d does not pass linearity test for alpha= -4, and beta= -5
System d does not pass linearity test for alpha= -4, and beta= -4
System d does not pass linearity test for alpha= -4, and beta= -3
System d does not pass linearity test for alpha= -4, and beta= -2
System d does not pass linearity test for alpha= -4, and beta= -1
System d does not pass linearity test for alpha= -4, and beta= 1
System d does not pass linearity test for alpha= -4, and beta= 2
System d does not pass linearity test for alpha= -4, and beta= 3
System d does not pass linearity test for alpha= -4, and beta= 4
System d does not pass linearity test for alpha= -4, and beta= 5
System d does not pass linearity test for alpha= -3, and beta= -5
System d does not pass linearity test for alpha= -3, and beta= -4
System d does not pass linearity test for alpha= -3, and beta= -3
System d does not pass linearity test for alpha= -3, and beta= -2
System d does not pass linearity test for alpha= -3, and beta= -1
System d does not pass linearity test for alpha= -3, and beta= 1
System d does not pass linearity test for alpha= -3, and beta= 2
System d does not pass linearity test for alpha= -3, and beta= 3
System d does not pass linearity test for alpha= -3, and beta= 4
System d does not pass linearity test for alpha= -3, and beta= 5
System d does not pass linearity test for alpha= -2, and beta= -5
System d does not pass linearity test for alpha= -2, and beta= -4
System d does not pass linearity test for alpha= -2, and beta= -3
System d does not pass linearity test for alpha= -2, and beta= -2
System d does not pass linearity test for alpha= -2, and beta= -1
System d does not pass linearity test for alpha= -2, and beta= 1
System d does not pass linearity test for alpha= -2, and beta= 2
System d does not pass linearity test for alpha= -2, and beta= 3
System d does not pass linearity test for alpha= -2, and beta= 4
System d does not pass linearity test for alpha= -2, and beta= 5
System d does not pass linearity test for alpha= -1, and beta= -5
System d does not pass linearity test for alpha= -1, and beta= -4
System d does not pass linearity test for alpha= -1, and beta= -3
System d does not pass linearity test for alpha= -1, and beta= -2
System d does not pass linearity test for alpha= -1, and beta= -1
System d does not pass linearity test for alpha= -1, and beta= 1
System d does not pass linearity test for alpha= -1, and beta= 2
System d does not pass linearity test for alpha= -1, and beta= 3
System d does not pass linearity test for alpha= -1, and beta= 4
System d does not pass linearity test for alpha= -1, and beta= 5
System d does not pass linearity test for alpha= 1, and beta= -5
System d does not pass linearity test for alpha= 1, and beta= -4
System d does not pass linearity test for alpha= 1, and beta= -3
System d does not pass linearity test for alpha= 1, and beta= -2
System d does not pass linearity test for alpha= 1, and beta= -1
System d does not pass linearity test for alpha= 1, and beta= 1
System d does not pass linearity test for alpha= 1, and beta= 2
System d does not pass linearity test for alpha= 1, and beta= 3
System d does not pass linearity test for alpha= 1, and beta= 4
System d does not pass linearity test for alpha= 1, and beta= 5
System d does not pass linearity test for alpha= 2, and beta= -5
System d does not pass linearity test for alpha= 2, and beta= -4
System d does not pass linearity test for alpha= 2, and beta= -3
System d does not pass linearity test for alpha= 2, and beta= -2
System d does not pass linearity test for alpha= 2, and beta= -1
System d does not pass linearity test for alpha= 2, and beta= 1
System d does not pass linearity test for alpha= 2, and beta= 2
System d does not pass linearity test for alpha= 2, and beta= 3
System d does not pass linearity test for alpha= 2, and beta= 4
System d does not pass linearity test for alpha= 2, and beta= 5
System d does not pass linearity test for alpha= 3, and beta= -5
System d does not pass linearity test for alpha= 3, and beta= -4
System d does not pass linearity test for alpha= 3, and beta= -3
System d does not pass linearity test for alpha= 3, and beta= -2
System d does not pass linearity test for alpha= 3, and beta= -1
System d does not pass linearity test for alpha= 3, and beta= 1
System d does not pass linearity test for alpha= 3, and beta= 2
System d does not pass linearity test for alpha= 3, and beta= 3
System d does not pass linearity test for alpha= 3, and beta= 4
System d does not pass linearity test for alpha= 3, and beta= 5
System d does not pass linearity test for alpha= 4, and beta= -5
System d does not pass linearity test for alpha= 4, and beta= -4
System d does not pass linearity test for alpha= 4, and beta= -3
System d does not pass linearity test for alpha= 4, and beta= -2
System d does not pass linearity test for alpha= 4, and beta= -1
System d does not pass linearity test for alpha= 4, and beta= 1
System d does not pass linearity test for alpha= 4, and beta= 2
System d does not pass linearity test for alpha= 4, and beta= 3
System d does not pass linearity test for alpha= 4, and beta= 4
System d does not pass linearity test for alpha= 4, and beta= 5
System d does not pass linearity test for alpha= 5, and beta= -5
System d does not pass linearity test for alpha= 5, and beta= -4
System d does not pass linearity test for alpha= 5, and beta= -3
System d does not pass linearity test for alpha= 5, and beta= -2
System d does not pass linearity test for alpha= 5, and beta= -1
System d does not pass linearity test for alpha= 5, and beta= 1
System d does not pass linearity test for alpha= 5, and beta= 2
System d does not pass linearity test for alpha= 5, and beta= 3
System d does not pass linearity test for alpha= 5, and beta= 4
System d does not pass linearity test for alpha= 5, and beta= 5
------------------------------------------------------------------
---------------------- Test for System e: ------------------------
System e passes linearity test for alpha= -5, and beta= -5
System e passes linearity test for alpha= -5, and beta= -4
System e passes linearity test for alpha= -5, and beta= -3
System e passes linearity test for alpha= -5, and beta= -2
System e passes linearity test for alpha= -5, and beta= -1
System e passes linearity test for alpha= -5, and beta= 1
System e passes linearity test for alpha= -5, and beta= 2
System e passes linearity test for alpha= -5, and beta= 3
System e passes linearity test for alpha= -5, and beta= 4
System e passes linearity test for alpha= -5, and beta= 5
System e passes linearity test for alpha= -4, and beta= -5
System e passes linearity test for alpha= -4, and beta= -4
System e passes linearity test for alpha= -4, and beta= -3
System e passes linearity test for alpha= -4, and beta= -2
System e passes linearity test for alpha= -4, and beta= -1
System e passes linearity test for alpha= -4, and beta= 1
System e passes linearity test for alpha= -4, and beta= 2
System e passes linearity test for alpha= -4, and beta= 3
System e passes linearity test for alpha= -4, and beta= 4
System e passes linearity test for alpha= -4, and beta= 5
System e passes linearity test for alpha= -3, and beta= -5
System e passes linearity test for alpha= -3, and beta= -4
System e passes linearity test for alpha= -3, and beta= -3
System e passes linearity test for alpha= -3, and beta= -2
System e passes linearity test for alpha= -3, and beta= -1
System e passes linearity test for alpha= -3, and beta= 1
System e passes linearity test for alpha= -3, and beta= 2
System e passes linearity test for alpha= -3, and beta= 3
System e passes linearity test for alpha= -3, and beta= 4
System e passes linearity test for alpha= -3, and beta= 5
System e passes linearity test for alpha= -2, and beta= -5
System e passes linearity test for alpha= -2, and beta= -4
System e passes linearity test for alpha= -2, and beta= -3
System e passes linearity test for alpha= -2, and beta= -2
System e passes linearity test for alpha= -2, and beta= -1
System e passes linearity test for alpha= -2, and beta= 1
System e passes linearity test for alpha= -2, and beta= 2
System e passes linearity test for alpha= -2, and beta= 3
System e passes linearity test for alpha= -2, and beta= 4
System e passes linearity test for alpha= -2, and beta= 5
System e passes linearity test for alpha= -1, and beta= -5
System e passes linearity test for alpha= -1, and beta= -4
System e passes linearity test for alpha= -1, and beta= -3
System e passes linearity test for alpha= -1, and beta= -2
System e passes linearity test for alpha= -1, and beta= -1
System e passes linearity test for alpha= -1, and beta= 1
System e passes linearity test for alpha= -1, and beta= 2
System e passes linearity test for alpha= -1, and beta= 3
System e passes linearity test for alpha= -1, and beta= 4
System e passes linearity test for alpha= -1, and beta= 5
System e passes linearity test for alpha= 1, and beta= -5
System e passes linearity test for alpha= 1, and beta= -4
System e passes linearity test for alpha= 1, and beta= -3
System e passes linearity test for alpha= 1, and beta= -2
System e passes linearity test for alpha= 1, and beta= -1
System e passes linearity test for alpha= 1, and beta= 1
System e passes linearity test for alpha= 1, and beta= 2
System e passes linearity test for alpha= 1, and beta= 3
System e passes linearity test for alpha= 1, and beta= 4
System e passes linearity test for alpha= 1, and beta= 5
System e passes linearity test for alpha= 2, and beta= -5
System e passes linearity test for alpha= 2, and beta= -4
System e passes linearity test for alpha= 2, and beta= -3
System e passes linearity test for alpha= 2, and beta= -2
System e passes linearity test for alpha= 2, and beta= -1
System e passes linearity test for alpha= 2, and beta= 1
System e passes linearity test for alpha= 2, and beta= 2
System e passes linearity test for alpha= 2, and beta= 3
System e passes linearity test for alpha= 2, and beta= 4
System e passes linearity test for alpha= 2, and beta= 5
System e passes linearity test for alpha= 3, and beta= -5
System e passes linearity test for alpha= 3, and beta= -4
System e passes linearity test for alpha= 3, and beta= -3
System e passes linearity test for alpha= 3, and beta= -2
System e passes linearity test for alpha= 3, and beta= -1
System e passes linearity test for alpha= 3, and beta= 1
System e passes linearity test for alpha= 3, and beta= 2
System e passes linearity test for alpha= 3, and beta= 3
System e passes linearity test for alpha= 3, and beta= 4
System e passes linearity test for alpha= 3, and beta= 5
System e passes linearity test for alpha= 4, and beta= -5
System e passes linearity test for alpha= 4, and beta= -4
System e passes linearity test for alpha= 4, and beta= -3
System e passes linearity test for alpha= 4, and beta= -2
System e passes linearity test for alpha= 4, and beta= -1
System e passes linearity test for alpha= 4, and beta= 1
System e passes linearity test for alpha= 4, and beta= 2
System e passes linearity test for alpha= 4, and beta= 3
System e passes linearity test for alpha= 4, and beta= 4
System e passes linearity test for alpha= 4, and beta= 5
System e passes linearity test for alpha= 5, and beta= -5
System e passes linearity test for alpha= 5, and beta= -4
System e passes linearity test for alpha= 5, and beta= -3
System e passes linearity test for alpha= 5, and beta= -2
System e passes linearity test for alpha= 5, and beta= -1
System e passes linearity test for alpha= 5, and beta= 1
System e passes linearity test for alpha= 5, and beta= 2
System e passes linearity test for alpha= 5, and beta= 3
System e passes linearity test for alpha= 5, and beta= 4
System e passes linearity test for alpha= 5, and beta= 5
------------------------------------------------------------------
-------------------- TESTS WITH INPUT SET #2 ---------------------
---------------------- Test for System a: ------------------------
System a passes linearity test for alpha= -5, and beta= -5
System a passes linearity test for alpha= -5, and beta= -4
System a passes linearity test for alpha= -5, and beta= -3
System a passes linearity test for alpha= -5, and beta= -2
System a passes linearity test for alpha= -5, and beta= -1
System a passes linearity test for alpha= -5, and beta= 1
System a passes linearity test for alpha= -5, and beta= 2
System a passes linearity test for alpha= -5, and beta= 3
System a passes linearity test for alpha= -5, and beta= 4
System a passes linearity test for alpha= -5, and beta= 5
System a passes linearity test for alpha= -4, and beta= -5
System a passes linearity test for alpha= -4, and beta= -4
System a passes linearity test for alpha= -4, and beta= -3
System a passes linearity test for alpha= -4, and beta= -2
System a passes linearity test for alpha= -4, and beta= -1
System a passes linearity test for alpha= -4, and beta= 1
System a passes linearity test for alpha= -4, and beta= 2
System a passes linearity test for alpha= -4, and beta= 3
System a passes linearity test for alpha= -4, and beta= 4
System a passes linearity test for alpha= -4, and beta= 5
System a passes linearity test for alpha= -3, and beta= -5
System a passes linearity test for alpha= -3, and beta= -4
System a passes linearity test for alpha= -3, and beta= -3
System a passes linearity test for alpha= -3, and beta= -2
System a passes linearity test for alpha= -3, and beta= -1
System a passes linearity test for alpha= -3, and beta= 1
System a passes linearity test for alpha= -3, and beta= 2
System a passes linearity test for alpha= -3, and beta= 3
System a passes linearity test for alpha= -3, and beta= 4
System a passes linearity test for alpha= -3, and beta= 5
System a passes linearity test for alpha= -2, and beta= -5
System a passes linearity test for alpha= -2, and beta= -4
System a passes linearity test for alpha= -2, and beta= -3
System a passes linearity test for alpha= -2, and beta= -2
System a passes linearity test for alpha= -2, and beta= -1
System a passes linearity test for alpha= -2, and beta= 1
System a passes linearity test for alpha= -2, and beta= 2
System a passes linearity test for alpha= -2, and beta= 3
System a passes linearity test for alpha= -2, and beta= 4
System a passes linearity test for alpha= -2, and beta= 5
System a passes linearity test for alpha= -1, and beta= -5
System a passes linearity test for alpha= -1, and beta= -4
System a passes linearity test for alpha= -1, and beta= -3
System a passes linearity test for alpha= -1, and beta= -2
System a passes linearity test for alpha= -1, and beta= -1
System a passes linearity test for alpha= -1, and beta= 1
System a passes linearity test for alpha= -1, and beta= 2
System a passes linearity test for alpha= -1, and beta= 3
System a passes linearity test for alpha= -1, and beta= 4
System a passes linearity test for alpha= -1, and beta= 5
System a passes linearity test for alpha= 1, and beta= -5
System a passes linearity test for alpha= 1, and beta= -4
System a passes linearity test for alpha= 1, and beta= -3
System a passes linearity test for alpha= 1, and beta= -2
System a passes linearity test for alpha= 1, and beta= -1
System a passes linearity test for alpha= 1, and beta= 1
System a passes linearity test for alpha= 1, and beta= 2
System a passes linearity test for alpha= 1, and beta= 3
System a passes linearity test for alpha= 1, and beta= 4
System a passes linearity test for alpha= 1, and beta= 5
System a passes linearity test for alpha= 2, and beta= -5
System a passes linearity test for alpha= 2, and beta= -4
System a passes linearity test for alpha= 2, and beta= -3
System a passes linearity test for alpha= 2, and beta= -2
System a passes linearity test for alpha= 2, and beta= -1
System a passes linearity test for alpha= 2, and beta= 1
System a passes linearity test for alpha= 2, and beta= 2
System a passes linearity test for alpha= 2, and beta= 3
System a passes linearity test for alpha= 2, and beta= 4
System a passes linearity test for alpha= 2, and beta= 5
System a passes linearity test for alpha= 3, and beta= -5
System a passes linearity test for alpha= 3, and beta= -4
System a passes linearity test for alpha= 3, and beta= -3
System a passes linearity test for alpha= 3, and beta= -2
System a passes linearity test for alpha= 3, and beta= -1
System a passes linearity test for alpha= 3, and beta= 1
System a passes linearity test for alpha= 3, and beta= 2
System a passes linearity test for alpha= 3, and beta= 3
System a passes linearity test for alpha= 3, and beta= 4
System a passes linearity test for alpha= 3, and beta= 5
System a passes linearity test for alpha= 4, and beta= -5
System a passes linearity test for alpha= 4, and beta= -4
System a passes linearity test for alpha= 4, and beta= -3
System a passes linearity test for alpha= 4, and beta= -2
System a passes linearity test for alpha= 4, and beta= -1
System a passes linearity test for alpha= 4, and beta= 1
System a passes linearity test for alpha= 4, and beta= 2
System a passes linearity test for alpha= 4, and beta= 3
System a passes linearity test for alpha= 4, and beta= 4
System a passes linearity test for alpha= 4, and beta= 5
System a passes linearity test for alpha= 5, and beta= -5
System a passes linearity test for alpha= 5, and beta= -4
System a passes linearity test for alpha= 5, and beta= -3
System a passes linearity test for alpha= 5, and beta= -2
System a passes linearity test for alpha= 5, and beta= -1
System a passes linearity test for alpha= 5, and beta= 1
System a passes linearity test for alpha= 5, and beta= 2
System a passes linearity test for alpha= 5, and beta= 3
System a passes linearity test for alpha= 5, and beta= 4
System a passes linearity test for alpha= 5, and beta= 5
-----------------------------------------------------------------
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--------------------- Test for System b: ------------------------
System b passes linearity test for alpha= -5, and beta= -5
System b passes linearity test for alpha= -5, and beta= -4
System b passes linearity test for alpha= -5, and beta= -3
System b passes linearity test for alpha= -5, and beta= -2
System b passes linearity test for alpha= -5, and beta= -1
System b passes linearity test for alpha= -5, and beta= 1
System b passes linearity test for alpha= -5, and beta= 2
System b passes linearity test for alpha= -5, and beta= 3
System b passes linearity test for alpha= -5, and beta= 4
System b passes linearity test for alpha= -5, and beta= 5
System b passes linearity test for alpha= -4, and beta= -5
System b passes linearity test for alpha= -4, and beta= -4
System b passes linearity test for alpha= -4, and beta= -3
System b passes linearity test for alpha= -4, and beta= -2
System b passes linearity test for alpha= -4, and beta= -1
System b passes linearity test for alpha= -4, and beta= 1
System b passes linearity test for alpha= -4, and beta= 2
System b passes linearity test for alpha= -4, and beta= 3
System b passes linearity test for alpha= -4, and beta= 4
System b passes linearity test for alpha= -4, and beta= 5
System b passes linearity test for alpha= -3, and beta= -5
System b passes linearity test for alpha= -3, and beta= -4
System b passes linearity test for alpha= -3, and beta= -3
System b passes linearity test for alpha= -3, and beta= -2
System b passes linearity test for alpha= -3, and beta= -1
System b passes linearity test for alpha= -3, and beta= 1
System b passes linearity test for alpha= -3, and beta= 2
System b passes linearity test for alpha= -3, and beta= 3
System b passes linearity test for alpha= -3, and beta= 4
System b passes linearity test for alpha= -3, and beta= 5
System b passes linearity test for alpha= -2, and beta= -5
System b passes linearity test for alpha= -2, and beta= -4
System b passes linearity test for alpha= -2, and beta= -3
System b passes linearity test for alpha= -2, and beta= -2
System b passes linearity test for alpha= -2, and beta= -1
System b passes linearity test for alpha= -2, and beta= 1
System b passes linearity test for alpha= -2, and beta= 2
System b passes linearity test for alpha= -2, and beta= 3
System b passes linearity test for alpha= -2, and beta= 4
System b passes linearity test for alpha= -2, and beta= 5
System b passes linearity test for alpha= -1, and beta= -5
System b passes linearity test for alpha= -1, and beta= -4
System b passes linearity test for alpha= -1, and beta= -3
System b passes linearity test for alpha= -1, and beta= -2
System b passes linearity test for alpha= -1, and beta= -1
System b passes linearity test for alpha= -1, and beta= 1
System b passes linearity test for alpha= -1, and beta= 2
System b passes linearity test for alpha= -1, and beta= 3
System b passes linearity test for alpha= -1, and beta= 4
System b passes linearity test for alpha= -1, and beta= 5
System b passes linearity test for alpha= 1, and beta= -5
System b passes linearity test for alpha= 1, and beta= -4
System b passes linearity test for alpha= 1, and beta= -3
System b passes linearity test for alpha= 1, and beta= -2
System b passes linearity test for alpha= 1, and beta= -1
System b passes linearity test for alpha= 1, and beta= 1
System b passes linearity test for alpha= 1, and beta= 2
System b passes linearity test for alpha= 1, and beta= 3
System b passes linearity test for alpha= 1, and beta= 4
System b passes linearity test for alpha= 1, and beta= 5
System b passes linearity test for alpha= 2, and beta= -5
System b passes linearity test for alpha= 2, and beta= -4
System b passes linearity test for alpha= 2, and beta= -3
System b passes linearity test for alpha= 2, and beta= -2
System b passes linearity test for alpha= 2, and beta= -1
System b passes linearity test for alpha= 2, and beta= 1
System b passes linearity test for alpha= 2, and beta= 2
System b passes linearity test for alpha= 2, and beta= 3
System b passes linearity test for alpha= 2, and beta= 4
System b passes linearity test for alpha= 2, and beta= 5
System b passes linearity test for alpha= 3, and beta= -5
System b passes linearity test for alpha= 3, and beta= -4
System b passes linearity test for alpha= 3, and beta= -3
System b passes linearity test for alpha= 3, and beta= -2
System b passes linearity test for alpha= 3, and beta= -1
System b passes linearity test for alpha= 3, and beta= 1
System b passes linearity test for alpha= 3, and beta= 2
System b passes linearity test for alpha= 3, and beta= 3
System b passes linearity test for alpha= 3, and beta= 4
System b passes linearity test for alpha= 3, and beta= 5
System b passes linearity test for alpha= 4, and beta= -5
System b passes linearity test for alpha= 4, and beta= -4
System b passes linearity test for alpha= 4, and beta= -3
System b passes linearity test for alpha= 4, and beta= -2
System b passes linearity test for alpha= 4, and beta= -1
System b passes linearity test for alpha= 4, and beta= 1
System b passes linearity test for alpha= 4, and beta= 2
System b passes linearity test for alpha= 4, and beta= 3
System b passes linearity test for alpha= 4, and beta= 4
System b passes linearity test for alpha= 4, and beta= 5
System b passes linearity test for alpha= 5, and beta= -5
System b passes linearity test for alpha= 5, and beta= -4
System b passes linearity test for alpha= 5, and beta= -3
System b passes linearity test for alpha= 5, and beta= -2
System b passes linearity test for alpha= 5, and beta= -1
System b passes linearity test for alpha= 5, and beta= 1
System b passes linearity test for alpha= 5, and beta= 2
System b passes linearity test for alpha= 5, and beta= 3
System b passes linearity test for alpha= 5, and beta= 4
System b passes linearity test for alpha= 5, and beta= 5
-----------------------------------------------------------------
--------------------- Test for System c: -----------------------
System c does not pass linearity test for alpha= -5, and beta= -5
System c does not pass linearity test for alpha= -5, and beta= -4
System c does not pass linearity test for alpha= -5, and beta= -3
System c does not pass linearity test for alpha= -5, and beta= -2
System c does not pass linearity test for alpha= -5, and beta= -1
System c does not pass linearity test for alpha= -5, and beta= 1
System c does not pass linearity test for alpha= -5, and beta= 2
System c does not pass linearity test for alpha= -5, and beta= 3
System c does not pass linearity test for alpha= -5, and beta= 4
System c does not pass linearity test for alpha= -5, and beta= 5
System c does not pass linearity test for alpha= -4, and beta= -5
System c does not pass linearity test for alpha= -4, and beta= -4
System c does not pass linearity test for alpha= -4, and beta= -3
System c does not pass linearity test for alpha= -4, and beta= -2
System c does not pass linearity test for alpha= -4, and beta= -1
System c does not pass linearity test for alpha= -4, and beta= 1
System c does not pass linearity test for alpha= -4, and beta= 2
System c does not pass linearity test for alpha= -4, and beta= 3
System c does not pass linearity test for alpha= -4, and beta= 4
System c passes linearity test for alpha= -4, and beta= 5
System c does not pass linearity test for alpha= -3, and beta= -5
System c does not pass linearity test for alpha= -3, and beta= -4
System c does not pass linearity test for alpha= -3, and beta= -3
System c does not pass linearity test for alpha= -3, and beta= -2
System c does not pass linearity test for alpha= -3, and beta= -1
System c does not pass linearity test for alpha= -3, and beta= 1
System c does not pass linearity test for alpha= -3, and beta= 2
System c does not pass linearity test for alpha= -3, and beta= 3
System c passes linearity test for alpha= -3, and beta= 4
System c does not pass linearity test for alpha= -3, and beta= 5
System c does not pass linearity test for alpha= -2, and beta= -5
System c does not pass linearity test for alpha= -2, and beta= -4
System c does not pass linearity test for alpha= -2, and beta= -3
System c does not pass linearity test for alpha= -2, and beta= -2
System c does not pass linearity test for alpha= -2, and beta= -1
System c does not pass linearity test for alpha= -2, and beta= 1
System c does not pass linearity test for alpha= -2, and beta= 2
System c passes linearity test for alpha= -2, and beta= 3
System c does not pass linearity test for alpha= -2, and beta= 4
System c does not pass linearity test for alpha= -2, and beta= 5
System c does not pass linearity test for alpha= -1, and beta= -5
System c does not pass linearity test for alpha= -1, and beta= -4
System c does not pass linearity test for alpha= -1, and beta= -3
System c does not pass linearity test for alpha= -1, and beta= -2
System c does not pass linearity test for alpha= -1, and beta= -1
System c does not pass linearity test for alpha= -1, and beta= 1
System c passes linearity test for alpha= -1, and beta= 2
System c does not pass linearity test for alpha= -1, and beta= 3
System c does not pass linearity test for alpha= -1, and beta= 4
System c does not pass linearity test for alpha= -1, and beta= 5
System c does not pass linearity test for alpha= 1, and beta= -5
System c does not pass linearity test for alpha= 1, and beta= -4
System c does not pass linearity test for alpha= 1, and beta= -3
System c does not pass linearity test for alpha= 1, and beta= -2
System c does not pass linearity test for alpha= 1, and beta= -1
System c does not pass linearity test for alpha= 1, and beta= 1
System c does not pass linearity test for alpha= 1, and beta= 2
System c does not pass linearity test for alpha= 1, and beta= 3
System c does not pass linearity test for alpha= 1, and beta= 4
System c does not pass linearity test for alpha= 1, and beta= 5
System c does not pass linearity test for alpha= 2, and beta= -5
System c does not pass linearity test for alpha= 2, and beta= -4
System c does not pass linearity test for alpha= 2, and beta= -3
System c does not pass linearity test for alpha= 2, and beta= -2
System c passes linearity test for alpha= 2, and beta= -1
System c does not pass linearity test for alpha= 2, and beta= 1
System c does not pass linearity test for alpha= 2, and beta= 2
System c does not pass linearity test for alpha= 2, and beta= 3
System c does not pass linearity test for alpha= 2, and beta= 4
System c does not pass linearity test for alpha= 2, and beta= 5
System c does not pass linearity test for alpha= 3, and beta= -5
System c does not pass linearity test for alpha= 3, and beta= -4
System c does not pass linearity test for alpha= 3, and beta= -3
System c passes linearity test for alpha= 3, and beta= -2
System c does not pass linearity test for alpha= 3, and beta= -1
System c does not pass linearity test for alpha= 3, and beta= 1
System c does not pass linearity test for alpha= 3, and beta= 2
System c does not pass linearity test for alpha= 3, and beta= 3
System c does not pass linearity test for alpha= 3, and beta= 4
System c does not pass linearity test for alpha= 3, and beta= 5
System c does not pass linearity test for alpha= 4, and beta= -5
System c does not pass linearity test for alpha= 4, and beta= -4
System c passes linearity test for alpha= 4, and beta= -3
System c does not pass linearity test for alpha= 4, and beta= -2
System c does not pass linearity test for alpha= 4, and beta= -1
System c does not pass linearity test for alpha= 4, and beta= 1
System c does not pass linearity test for alpha= 4, and beta= 2
System c does not pass linearity test for alpha= 4, and beta= 3
System c does not pass linearity test for alpha= 4, and beta= 4
System c does not pass linearity test for alpha= 4, and beta= 5
System c does not pass linearity test for alpha= 5, and beta= -5
System c passes linearity test for alpha= 5, and beta= -4
System c does not pass linearity test for alpha= 5, and beta= -3
System c does not pass linearity test for alpha= 5, and beta= -2
System c does not pass linearity test for alpha= 5, and beta= -1
System c does not pass linearity test for alpha= 5, and beta= 1
System c does not pass linearity test for alpha= 5, and beta= 2
System c does not pass linearity test for alpha= 5, and beta= 3
System c does not pass linearity test for alpha= 5, and beta= 4
System c does not pass linearity test for alpha= 5, and beta= 5
------------------------------------------------------------------
--------------------- Test for System d: ------------------------
System d does not pass linearity test for alpha= -5, and beta= -5
System d does not pass linearity test for alpha= -5, and beta= -4
System d does not pass linearity test for alpha= -5, and beta= -3
System d does not pass linearity test for alpha= -5, and beta= -2
System d does not pass linearity test for alpha= -5, and beta= -1
System d does not pass linearity test for alpha= -5, and beta= 1
System d does not pass linearity test for alpha= -5, and beta= 2
System d does not pass linearity test for alpha= -5, and beta= 3
System d does not pass linearity test for alpha= -5, and beta= 4
System d does not pass linearity test for alpha= -5, and beta= 5
System d does not pass linearity test for alpha= -4, and beta= -5
System d does not pass linearity test for alpha= -4, and beta= -4
System d does not pass linearity test for alpha= -4, and beta= -3
System d does not pass linearity test for alpha= -4, and beta= -2
System d does not pass linearity test for alpha= -4, and beta= -1
System d does not pass linearity test for alpha= -4, and beta= 1
System d does not pass linearity test for alpha= -4, and beta= 2
System d does not pass linearity test for alpha= -4, and beta= 3
System d does not pass linearity test for alpha= -4, and beta= 4
System d does not pass linearity test for alpha= -4, and beta= 5
System d does not pass linearity test for alpha= -3, and beta= -5
System d does not pass linearity test for alpha= -3, and beta= -4
System d does not pass linearity test for alpha= -3, and beta= -3
System d does not pass linearity test for alpha= -3, and beta= -2
System d does not pass linearity test for alpha= -3, and beta= -1
System d does not pass linearity test for alpha= -3, and beta= 1
System d does not pass linearity test for alpha= -3, and beta= 2
System d does not pass linearity test for alpha= -3, and beta= 3
System d does not pass linearity test for alpha= -3, and beta= 4
System d does not pass linearity test for alpha= -3, and beta= 5
System d does not pass linearity test for alpha= -2, and beta= -5
System d does not pass linearity test for alpha= -2, and beta= -4
System d does not pass linearity test for alpha= -2, and beta= -3
System d does not pass linearity test for alpha= -2, and beta= -2
System d does not pass linearity test for alpha= -2, and beta= -1
System d does not pass linearity test for alpha= -2, and beta= 1
System d does not pass linearity test for alpha= -2, and beta= 2
System d does not pass linearity test for alpha= -2, and beta= 3
System d does not pass linearity test for alpha= -2, and beta= 4
System d does not pass linearity test for alpha= -2, and beta= 5
System d does not pass linearity test for alpha= -1, and beta= -5
System d does not pass linearity test for alpha= -1, and beta= -4
System d does not pass linearity test for alpha= -1, and beta= -3
System d does not pass linearity test for alpha= -1, and beta= -2
System d does not pass linearity test for alpha= -1, and beta= -1
System d does not pass linearity test for alpha= -1, and beta= 1
System d does not pass linearity test for alpha= -1, and beta= 2
System d does not pass linearity test for alpha= -1, and beta= 3
System d does not pass linearity test for alpha= -1, and beta= 4
System d does not pass linearity test for alpha= -1, and beta= 5
System d does not pass linearity test for alpha= 1, and beta= -5
System d does not pass linearity test for alpha= 1, and beta= -4
System d does not pass linearity test for alpha= 1, and beta= -3
System d does not pass linearity test for alpha= 1, and beta= -2
System d does not pass linearity test for alpha= 1, and beta= -1
System d does not pass linearity test for alpha= 1, and beta= 1
System d does not pass linearity test for alpha= 1, and beta= 2
System d does not pass linearity test for alpha= 1, and beta= 3
System d does not pass linearity test for alpha= 1, and beta= 4
System d does not pass linearity test for alpha= 1, and beta= 5
System d does not pass linearity test for alpha= 2, and beta= -5
System d does not pass linearity test for alpha= 2, and beta= -4
System d does not pass linearity test for alpha= 2, and beta= -3
System d does not pass linearity test for alpha= 2, and beta= -2
System d does not pass linearity test for alpha= 2, and beta= -1
System d does not pass linearity test for alpha= 2, and beta= 1
System d does not pass linearity test for alpha= 2, and beta= 2
System d does not pass linearity test for alpha= 2, and beta= 3
System d does not pass linearity test for alpha= 2, and beta= 4
System d does not pass linearity test for alpha= 2, and beta= 5
System d does not pass linearity test for alpha= 3, and beta= -5
System d does not pass linearity test for alpha= 3, and beta= -4
System d does not pass linearity test for alpha= 3, and beta= -3
System d does not pass linearity test for alpha= 3, and beta= -2
System d does not pass linearity test for alpha= 3, and beta= -1
System d does not pass linearity test for alpha= 3, and beta= 1
System d does not pass linearity test for alpha= 3, and beta= 2
System d does not pass linearity test for alpha= 3, and beta= 3
System d does not pass linearity test for alpha= 3, and beta= 4
System d does not pass linearity test for alpha= 3, and beta= 5
System d does not pass linearity test for alpha= 4, and beta= -5
System d does not pass linearity test for alpha= 4, and beta= -4
System d does not pass linearity test for alpha= 4, and beta= -3
System d does not pass linearity test for alpha= 4, and beta= -2
System d does not pass linearity test for alpha= 4, and beta= -1
System d does not pass linearity test for alpha= 4, and beta= 1
System d does not pass linearity test for alpha= 4, and beta= 2
System d does not pass linearity test for alpha= 4, and beta= 3
System d does not pass linearity test for alpha= 4, and beta= 4
System d does not pass linearity test for alpha= 4, and beta= 5
System d does not pass linearity test for alpha= 5, and beta= -5
System d does not pass linearity test for alpha= 5, and beta= -4
System d does not pass linearity test for alpha= 5, and beta= -3
System d does not pass linearity test for alpha= 5, and beta= -2
System d does not pass linearity test for alpha= 5, and beta= -1
System d does not pass linearity test for alpha= 5, and beta= 1
System d does not pass linearity test for alpha= 5, and beta= 2
System d does not pass linearity test for alpha= 5, and beta= 3
System d does not pass linearity test for alpha= 5, and beta= 4
System d does not pass linearity test for alpha= 5, and beta= 5
------------------------------------------------------------------
---------------------- Test for System e: ------------------------
System e passes linearity test for alpha= -5, and beta= -5
System e passes linearity test for alpha= -5, and beta= -4
System e passes linearity test for alpha= -5, and beta= -3
System e passes linearity test for alpha= -5, and beta= -2
System e passes linearity test for alpha= -5, and beta= -1
System e passes linearity test for alpha= -5, and beta= 1
System e passes linearity test for alpha= -5, and beta= 2
System e passes linearity test for alpha= -5, and beta= 3
System e passes linearity test for alpha= -5, and beta= 4
System e passes linearity test for alpha= -5, and beta= 5
System e passes linearity test for alpha= -4, and beta= -5
System e passes linearity test for alpha= -4, and beta= -4
System e passes linearity test for alpha= -4, and beta= -3
System e passes linearity test for alpha= -4, and beta= -2
System e passes linearity test for alpha= -4, and beta= -1
System e passes linearity test for alpha= -4, and beta= 1
System e passes linearity test for alpha= -4, and beta= 2
System e passes linearity test for alpha= -4, and beta= 3
System e passes linearity test for alpha= -4, and beta= 4
System e passes linearity test for alpha= -4, and beta= 5
System e passes linearity test for alpha= -3, and beta= -5
System e passes linearity test for alpha= -3, and beta= -4
System e passes linearity test for alpha= -3, and beta= -3
System e passes linearity test for alpha= -3, and beta= -2
System e passes linearity test for alpha= -3, and beta= -1
System e passes linearity test for alpha= -3, and beta= 1
System e passes linearity test for alpha= -3, and beta= 2
System e passes linearity test for alpha= -3, and beta= 3
System e passes linearity test for alpha= -3, and beta= 4
System e passes linearity test for alpha= -3, and beta= 5
System e passes linearity test for alpha= -2, and beta= -5
System e passes linearity test for alpha= -2, and beta= -4
System e passes linearity test for alpha= -2, and beta= -3
System e passes linearity test for alpha= -2, and beta= -2
System e passes linearity test for alpha= -2, and beta= -1
System e passes linearity test for alpha= -2, and beta= 1
System e passes linearity test for alpha= -2, and beta= 2
System e passes linearity test for alpha= -2, and beta= 3
System e passes linearity test for alpha= -2, and beta= 4
System e passes linearity test for alpha= -2, and beta= 5
System e passes linearity test for alpha= -1, and beta= -5
System e passes linearity test for alpha= -1, and beta= -4
System e passes linearity test for alpha= -1, and beta= -3
System e passes linearity test for alpha= -1, and beta= -2
System e passes linearity test for alpha= -1, and beta= -1
System e passes linearity test for alpha= -1, and beta= 1
System e passes linearity test for alpha= -1, and beta= 2
System e passes linearity test for alpha= -1, and beta= 3
System e passes linearity test for alpha= -1, and beta= 4
System e passes linearity test for alpha= -1, and beta= 5
System e passes linearity test for alpha= 1, and beta= -5
System e passes linearity test for alpha= 1, and beta= -4
System e passes linearity test for alpha= 1, and beta= -3
System e passes linearity test for alpha= 1, and beta= -2
System e passes linearity test for alpha= 1, and beta= -1
System e passes linearity test for alpha= 1, and beta= 1
System e passes linearity test for alpha= 1, and beta= 2
System e passes linearity test for alpha= 1, and beta= 3
System e passes linearity test for alpha= 1, and beta= 4
System e passes linearity test for alpha= 1, and beta= 5
System e passes linearity test for alpha= 2, and beta= -5
System e passes linearity test for alpha= 2, and beta= -4
System e passes linearity test for alpha= 2, and beta= -3
System e passes linearity test for alpha= 2, and beta= -2
System e passes linearity test for alpha= 2, and beta= -1
System e passes linearity test for alpha= 2, and beta= 1
System e passes linearity test for alpha= 2, and beta= 2
System e passes linearity test for alpha= 2, and beta= 3
System e passes linearity test for alpha= 2, and beta= 4
System e passes linearity test for alpha= 2, and beta= 5
System e passes linearity test for alpha= 3, and beta= -5
System e passes linearity test for alpha= 3, and beta= -4
System e passes linearity test for alpha= 3, and beta= -3
System e passes linearity test for alpha= 3, and beta= -2
System e passes linearity test for alpha= 3, and beta= -1
System e passes linearity test for alpha= 3, and beta= 1
System e passes linearity test for alpha= 3, and beta= 2
System e passes linearity test for alpha= 3, and beta= 3
System e passes linearity test for alpha= 3, and beta= 4
System e passes linearity test for alpha= 3, and beta= 5
System e passes linearity test for alpha= 4, and beta= -5
System e passes linearity test for alpha= 4, and beta= -4
System e passes linearity test for alpha= 4, and beta= -3
System e passes linearity test for alpha= 4, and beta= -2
System e passes linearity test for alpha= 4, and beta= -1
System e passes linearity test for alpha= 4, and beta= 1
System e passes linearity test for alpha= 4, and beta= 2
System e passes linearity test for alpha= 4, and beta= 3
System e passes linearity test for alpha= 4, and beta= 4
System e passes linearity test for alpha= 4, and beta= 5
System e passes linearity test for alpha= 5, and beta= -5
System e passes linearity test for alpha= 5, and beta= -4
System e passes linearity test for alpha= 5, and beta= -3
System e passes linearity test for alpha= 5, and beta= -2
System e passes linearity test for alpha= 5, and beta= -1
System e passes linearity test for alpha= 5, and beta= 1
System e passes linearity test for alpha= 5, and beta= 2
System e passes linearity test for alpha= 5, and beta= 3
System e passes linearity test for alpha= 5, and beta= 4
System e passes linearity test for alpha= 5, and beta= 5
```

Output of Time Invariance Test

```
-------------------- TESTS WITH INPUT #1 ---------------------
--------------------- Test for System a: -----------------------
System a does not pass time invariance test for n0= -50
System a does not pass time invariance test for n0= -49
System a does not pass time invariance test for n0= -48
System a does not pass time invariance test for n0= -47
System a does not pass time invariance test for n0= -46
System a does not pass time invariance test for n0= -45
System a does not pass time invariance test for n0= -44
System a does not pass time invariance test for n0= -43
System a does not pass time invariance test for n0= -42
System a does not pass time invariance test for n0= -41
System a does not pass time invariance test for n0= -40
System a does not pass time invariance test for n0= -39
System a does not pass time invariance test for n0= -38
System a does not pass time invariance test for n0= -37
System a does not pass time invariance test for n0= -36
System a does not pass time invariance test for n0= -35
System a does not pass time invariance test for n0= -34
System a does not pass time invariance test for n0= -33
System a does not pass time invariance test for n0= -32
System a does not pass time invariance test for n0= -31
System a does not pass time invariance test for n0= -30
System a does not pass time invariance test for n0= -29
System a does not pass time invariance test for n0= -28
System a does not pass time invariance test for n0= -27
System a does not pass time invariance test for n0= -26
System a does not pass time invariance test for n0= -25
System a does not pass time invariance test for n0= -24
System a does not pass time invariance test for n0= -23
System a does not pass time invariance test for n0= -22
System a does not pass time invariance test for n0= -21
System a does not pass time invariance test for n0= -20
System a does not pass time invariance test for n0= -19
System a does not pass time invariance test for n0= -18
System a does not pass time invariance test for n0= -17
System a does not pass time invariance test for n0= -16
System a does not pass time invariance test for n0= -15
System a does not pass time invariance test for n0= -14
System a does not pass time invariance test for n0= -13
System a does not pass time invariance test for n0= -12
System a does not pass time invariance test for n0= -11
System a does not pass time invariance test for n0= -10
System a does not pass time invariance test for n0= -9
System a does not pass time invariance test for n0= -8
System a does not pass time invariance test for n0= -7
System a does not pass time invariance test for n0= -6
System a does not pass time invariance test for n0= -5
System a does not pass time invariance test for n0= -4
System a does not pass time invariance test for n0= -3
System a does not pass time invariance test for n0= -2
System a does not pass time invariance test for n0= -1
System a does not pass time invariance test for n0= 1
System a does not pass time invariance test for n0= 2
System a does not pass time invariance test for n0= 3
System a does not pass time invariance test for n0= 4
System a does not pass time invariance test for n0= 5
System a does not pass time invariance test for n0= 6
System a does not pass time invariance test for n0= 7
System a does not pass time invariance test for n0= 8
System a does not pass time invariance test for n0= 9
System a does not pass time invariance test for n0= 10
System a does not pass time invariance test for n0= 11
System a does not pass time invariance test for n0= 12
System a does not pass time invariance test for n0= 13
System a does not pass time invariance test for n0= 14
System a does not pass time invariance test for n0= 15
System a does not pass time invariance test for n0= 16
System a does not pass time invariance test for n0= 17
System a does not pass time invariance test for n0= 18
System a does not pass time invariance test for n0= 19
System a does not pass time invariance test for n0= 20
System a does not pass time invariance test for n0= 21
System a does not pass time invariance test for n0= 22
System a does not pass time invariance test for n0= 23
System a does not pass time invariance test for n0= 24
System a does not pass time invariance test for n0= 25
System a does not pass time invariance test for n0= 26
System a does not pass time invariance test for n0= 27
System a does not pass time invariance test for n0= 28
System a does not pass time invariance test for n0= 29
System a does not pass time invariance test for n0= 30
System a does not pass time invariance test for n0= 31
System a does not pass time invariance test for n0= 32
System a does not pass time invariance test for n0= 33
System a does not pass time invariance test for n0= 34
System a does not pass time invariance test for n0= 35
System a does not pass time invariance test for n0= 36
System a does not pass time invariance test for n0= 37
System a does not pass time invariance test for n0= 38
System a does not pass time invariance test for n0= 39
System a does not pass time invariance test for n0= 40
System a does not pass time invariance test for n0= 41
System a does not pass time invariance test for n0= 42
System a does not pass time invariance test for n0= 43
System a does not pass time invariance test for n0= 44
System a does not pass time invariance test for n0= 45
System a does not pass time invariance test for n0= 46
System a does not pass time invariance test for n0= 47
System a does not pass time invariance test for n0= 48
System a does not pass time invariance test for n0= 49
System a does not pass time invariance test for n0= 50
------------------------------------------------------------------
---------------------- Test for System b: ------------------------
System b does not pass time invariance test for n0= -50
System b does not pass time invariance test for n0= -49
System b does not pass time invariance test for n0= -48
System b does not pass time invariance test for n0= -47
System b does not pass time invariance test for n0= -46
System b does not pass time invariance test for n0= -45
System b does not pass time invariance test for n0= -44
System b does not pass time invariance test for n0= -43
System b does not pass time invariance test for n0= -42
System b does not pass time invariance test for n0= -41
System b does not pass time invariance test for n0= -40
System b does not pass time invariance test for n0= -39
System b does not pass time invariance test for n0= -38
System b does not pass time invariance test for n0= -37
System b does not pass time invariance test for n0= -36
System b does not pass time invariance test for n0= -35
System b does not pass time invariance test for n0= -34
System b does not pass time invariance test for n0= -33
System b does not pass time invariance test for n0= -32
System b does not pass time invariance test for n0= -31
System b does not pass time invariance test for n0= -30
System b does not pass time invariance test for n0= -29
System b does not pass time invariance test for n0= -28
System b does not pass time invariance test for n0= -27
System b does not pass time invariance test for n0= -26
System b does not pass time invariance test for n0= -25
System b does not pass time invariance test for n0= -24
System b does not pass time invariance test for n0= -23
System b does not pass time invariance test for n0= -22
System b does not pass time invariance test for n0= -21
System b does not pass time invariance test for n0= -20
System b does not pass time invariance test for n0= -19
System b does not pass time invariance test for n0= -18
System b does not pass time invariance test for n0= -17
System b does not pass time invariance test for n0= -16
System b does not pass time invariance test for n0= -15
System b does not pass time invariance test for n0= -14
System b does not pass time invariance test for n0= -13
System b does not pass time invariance test for n0= -12
System b does not pass time invariance test for n0= -11
System b does not pass time invariance test for n0= -10
System b does not pass time invariance test for n0= -9
System b does not pass time invariance test for n0= -8
System b does not pass time invariance test for n0= -7
System b does not pass time invariance test for n0= -6
System b does not pass time invariance test for n0= -5
System b does not pass time invariance test for n0= -4
System b does not pass time invariance test for n0= -3
System b does not pass time invariance test for n0= -2
System b does not pass time invariance test for n0= -1
System b does not pass time invariance test for n0= 1
System b does not pass time invariance test for n0= 2
System b does not pass time invariance test for n0= 3
System b does not pass time invariance test for n0= 4
System b does not pass time invariance test for n0= 5
System b does not pass time invariance test for n0= 6
System b does not pass time invariance test for n0= 7
System b does not pass time invariance test for n0= 8
System b does not pass time invariance test for n0= 9
System b does not pass time invariance test for n0= 10
System b does not pass time invariance test for n0= 11
System b does not pass time invariance test for n0= 12
System b does not pass time invariance test for n0= 13
System b does not pass time invariance test for n0= 14
System b does not pass time invariance test for n0= 15
System b does not pass time invariance test for n0= 16
System b does not pass time invariance test for n0= 17
System b does not pass time invariance test for n0= 18
System b does not pass time invariance test for n0= 19
System b does not pass time invariance test for n0= 20
System b does not pass time invariance test for n0= 21
System b does not pass time invariance test for n0= 22
System b does not pass time invariance test for n0= 23
System b does not pass time invariance test for n0= 24
System b does not pass time invariance test for n0= 25
System b does not pass time invariance test for n0= 26
System b does not pass time invariance test for n0= 27
System b does not pass time invariance test for n0= 28
System b does not pass time invariance test for n0= 29
System b does not pass time invariance test for n0= 30
System b does not pass time invariance test for n0= 31
System b does not pass time invariance test for n0= 32
System b does not pass time invariance test for n0= 33
System b does not pass time invariance test for n0= 34
System b does not pass time invariance test for n0= 35
System b does not pass time invariance test for n0= 36
System b does not pass time invariance test for n0= 37
System b does not pass time invariance test for n0= 38
System b does not pass time invariance test for n0= 39
System b does not pass time invariance test for n0= 40
System b does not pass time invariance test for n0= 41
System b does not pass time invariance test for n0= 42
System b does not pass time invariance test for n0= 43
System b does not pass time invariance test for n0= 44
System b does not pass time invariance test for n0= 45
System b does not pass time invariance test for n0= 46
System b does not pass time invariance test for n0= 47
System b does not pass time invariance test for n0= 48
System b does not pass time invariance test for n0= 49
System b does not pass time invariance test for n0= 50
-----------------------------------------------------------------
---------------------- Test for System c: ------------------------
System c passes time invariance test for n0= -50
System c passes time invariance test for n0= -49
System c passes time invariance test for n0= -48
System c passes time invariance test for n0= -47
System c passes time invariance test for n0= -46
System c passes time invariance test for n0= -45
System c passes time invariance test for n0= -44
System c passes time invariance test for n0= -43
System c passes time invariance test for n0= -42
System c passes time invariance test for n0= -41
System c passes time invariance test for n0= -40
System c passes time invariance test for n0= -39
System c passes time invariance test for n0= -38
System c passes time invariance test for n0= -37
System c passes time invariance test for n0= -36
System c passes time invariance test for n0= -35
System c passes time invariance test for n0= -34
System c passes time invariance test for n0= -33
System c passes time invariance test for n0= -32
System c passes time invariance test for n0= -31
System c passes time invariance test for n0= -30
System c passes time invariance test for n0= -29
System c passes time invariance test for n0= -28
System c passes time invariance test for n0= -27
System c passes time invariance test for n0= -26
System c passes time invariance test for n0= -25
System c passes time invariance test for n0= -24
System c passes time invariance test for n0= -23
System c passes time invariance test for n0= -22
System c passes time invariance test for n0= -21
System c passes time invariance test for n0= -20
System c passes time invariance test for n0= -19
System c passes time invariance test for n0= -18
System c passes time invariance test for n0= -17
System c passes time invariance test for n0= -16
System c passes time invariance test for n0= -15
System c passes time invariance test for n0= -14
System c passes time invariance test for n0= -13
System c passes time invariance test for n0= -12
System c passes time invariance test for n0= -11
System c passes time invariance test for n0= -10
System c passes time invariance test for n0= -9
System c passes time invariance test for n0= -8
System c passes time invariance test for n0= -7
System c passes time invariance test for n0= -6
System c passes time invariance test for n0= -5
System c passes time invariance test for n0= -4
System c passes time invariance test for n0= -3
System c passes time invariance test for n0= -2
System c passes time invariance test for n0= -1
System c passes time invariance test for n0= 1
System c passes time invariance test for n0= 2
System c passes time invariance test for n0= 3
System c passes time invariance test for n0= 4
System c passes time invariance test for n0= 5
System c passes time invariance test for n0= 6
System c passes time invariance test for n0= 7
System c passes time invariance test for n0= 8
System c passes time invariance test for n0= 9
System c passes time invariance test for n0= 10
System c passes time invariance test for n0= 11
System c passes time invariance test for n0= 12
System c passes time invariance test for n0= 13
System c passes time invariance test for n0= 14
System c passes time invariance test for n0= 15
System c passes time invariance test for n0= 16
System c passes time invariance test for n0= 17
System c passes time invariance test for n0= 18
System c passes time invariance test for n0= 19
System c passes time invariance test for n0= 20
System c passes time invariance test for n0= 21
System c passes time invariance test for n0= 22
System c passes time invariance test for n0= 23
System c passes time invariance test for n0= 24
System c passes time invariance test for n0= 25
System c passes time invariance test for n0= 26
System c passes time invariance test for n0= 27
System c passes time invariance test for n0= 28
System c passes time invariance test for n0= 29
System c passes time invariance test for n0= 30
System c passes time invariance test for n0= 31
System c passes time invariance test for n0= 32
System c passes time invariance test for n0= 33
System c passes time invariance test for n0= 34
System c passes time invariance test for n0= 35
System c passes time invariance test for n0= 36
System c passes time invariance test for n0= 37
System c passes time invariance test for n0= 38
System c passes time invariance test for n0= 39
System c passes time invariance test for n0= 40
System c passes time invariance test for n0= 41
System c passes time invariance test for n0= 42
System c passes time invariance test for n0= 43
System c passes time invariance test for n0= 44
System c passes time invariance test for n0= 45
System c passes time invariance test for n0= 46
System c passes time invariance test for n0= 47
System c passes time invariance test for n0= 48
System c passes time invariance test for n0= 49
System c passes time invariance test for n0= 50
------------------------------------------------------------------
---------------------- Test for System d: ------------------------
System d passes time invariance test for n0= -50
System d passes time invariance test for n0= -49
System d passes time invariance test for n0= -48
System d passes time invariance test for n0= -47
System d passes time invariance test for n0= -46
System d passes time invariance test for n0= -45
System d passes time invariance test for n0= -44
System d passes time invariance test for n0= -43
System d passes time invariance test for n0= -42
System d passes time invariance test for n0= -41
System d passes time invariance test for n0= -40
System d passes time invariance test for n0= -39
System d passes time invariance test for n0= -38
System d passes time invariance test for n0= -37
System d passes time invariance test for n0= -36
System d passes time invariance test for n0= -35
System d passes time invariance test for n0= -34
System d passes time invariance test for n0= -33
System d passes time invariance test for n0= -32
System d passes time invariance test for n0= -31
System d passes time invariance test for n0= -30
System d passes time invariance test for n0= -29
System d passes time invariance test for n0= -28
System d passes time invariance test for n0= -27
System d passes time invariance test for n0= -26
System d passes time invariance test for n0= -25
System d passes time invariance test for n0= -24
System d passes time invariance test for n0= -23
System d passes time invariance test for n0= -22
System d passes time invariance test for n0= -21
System d passes time invariance test for n0= -20
System d passes time invariance test for n0= -19
System d passes time invariance test for n0= -18
System d passes time invariance test for n0= -17
System d passes time invariance test for n0= -16
System d passes time invariance test for n0= -15
System d passes time invariance test for n0= -14
System d passes time invariance test for n0= -13
System d passes time invariance test for n0= -12
System d passes time invariance test for n0= -11
System d passes time invariance test for n0= -10
System d passes time invariance test for n0= -9
System d passes time invariance test for n0= -8
System d passes time invariance test for n0= -7
System d passes time invariance test for n0= -6
System d passes time invariance test for n0= -5
System d passes time invariance test for n0= -4
System d passes time invariance test for n0= -3
System d passes time invariance test for n0= -2
System d passes time invariance test for n0= -1
System d passes time invariance test for n0= 1
System d passes time invariance test for n0= 2
System d passes time invariance test for n0= 3
System d passes time invariance test for n0= 4
System d passes time invariance test for n0= 5
System d passes time invariance test for n0= 6
System d passes time invariance test for n0= 7
System d passes time invariance test for n0= 8
System d passes time invariance test for n0= 9
System d passes time invariance test for n0= 10
System d passes time invariance test for n0= 11
System d passes time invariance test for n0= 12
System d passes time invariance test for n0= 13
System d passes time invariance test for n0= 14
System d passes time invariance test for n0= 15
System d passes time invariance test for n0= 16
System d passes time invariance test for n0= 17
System d passes time invariance test for n0= 18
System d passes time invariance test for n0= 19
System d passes time invariance test for n0= 20
System d passes time invariance test for n0= 21
System d passes time invariance test for n0= 22
System d passes time invariance test for n0= 23
System d passes time invariance test for n0= 24
System d passes time invariance test for n0= 25
System d passes time invariance test for n0= 26
System d passes time invariance test for n0= 27
System d passes time invariance test for n0= 28
System d passes time invariance test for n0= 29
System d passes time invariance test for n0= 30
System d passes time invariance test for n0= 31
System d passes time invariance test for n0= 32
System d passes time invariance test for n0= 33
System d passes time invariance test for n0= 34
System d passes time invariance test for n0= 35
System d passes time invariance test for n0= 36
System d passes time invariance test for n0= 37
System d passes time invariance test for n0= 38
System d passes time invariance test for n0= 39
System d passes time invariance test for n0= 40
System d passes time invariance test for n0= 41
System d passes time invariance test for n0= 42
System d passes time invariance test for n0= 43
System d passes time invariance test for n0= 44
System d passes time invariance test for n0= 45
System d passes time invariance test for n0= 46
System d passes time invariance test for n0= 47
System d passes time invariance test for n0= 48
System d passes time invariance test for n0= 49
System d passes time invariance test for n0= 50
-----------------------------------------------------------------
--------------------- Test for System e: -----------------------
System e passes time invariance test for n0= -50
System e passes time invariance test for n0= -49
System e passes time invariance test for n0= -48
System e passes time invariance test for n0= -47
System e passes time invariance test for n0= -46
System e passes time invariance test for n0= -45
System e passes time invariance test for n0= -44
System e passes time invariance test for n0= -43
System e passes time invariance test for n0= -42
System e passes time invariance test for n0= -41
System e passes time invariance test for n0= -40
System e passes time invariance test for n0= -39
System e passes time invariance test for n0= -38
System e passes time invariance test for n0= -37
System e passes time invariance test for n0= -36
System e passes time invariance test for n0= -35
System e passes time invariance test for n0= -34
System e passes time invariance test for n0= -33
System e passes time invariance test for n0= -32
System e passes time invariance test for n0= -31
System e passes time invariance test for n0= -30
System e passes time invariance test for n0= -29
System e passes time invariance test for n0= -28
System e passes time invariance test for n0= -27
System e passes time invariance test for n0= -26
System e passes time invariance test for n0= -25
System e passes time invariance test for n0= -24
System e passes time invariance test for n0= -23
System e passes time invariance test for n0= -22
System e passes time invariance test for n0= -21
System e passes time invariance test for n0= -20
System e passes time invariance test for n0= -19
System e passes time invariance test for n0= -18
System e passes time invariance test for n0= -17
System e passes time invariance test for n0= -16
System e passes time invariance test for n0= -15
System e passes time invariance test for n0= -14
System e passes time invariance test for n0= -13
System e passes time invariance test for n0= -12
System e passes time invariance test for n0= -11
System e passes time invariance test for n0= -10
System e passes time invariance test for n0= -9
System e passes time invariance test for n0= -8
System e passes time invariance test for n0= -7
System e passes time invariance test for n0= -6
System e passes time invariance test for n0= -5
System e passes time invariance test for n0= -4
System e passes time invariance test for n0= -3
System e passes time invariance test for n0= -2
System e passes time invariance test for n0= -1
System e passes time invariance test for n0= 1
System e passes time invariance test for n0= 2
System e passes time invariance test for n0= 3
System e passes time invariance test for n0= 4
System e passes time invariance test for n0= 5
System e passes time invariance test for n0= 6
System e passes time invariance test for n0= 7
System e passes time invariance test for n0= 8
System e passes time invariance test for n0= 9
System e passes time invariance test for n0= 10
System e passes time invariance test for n0= 11
System e passes time invariance test for n0= 12
System e passes time invariance test for n0= 13
System e passes time invariance test for n0= 14
System e passes time invariance test for n0= 15
System e passes time invariance test for n0= 16
System e passes time invariance test for n0= 17
System e passes time invariance test for n0= 18
System e passes time invariance test for n0= 19
System e passes time invariance test for n0= 20
System e passes time invariance test for n0= 21
System e passes time invariance test for n0= 22
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System e passes time invariance test for n0= 24
System e passes time invariance test for n0= 25
System e passes time invariance test for n0= 26
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System e passes time invariance test for n0= 28
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System e passes time invariance test for n0= 38
System e passes time invariance test for n0= 39
System e passes time invariance test for n0= 40
System e passes time invariance test for n0= 41
System e passes time invariance test for n0= 42
System e passes time invariance test for n0= 43
System e passes time invariance test for n0= 44
System e passes time invariance test for n0= 45
System e passes time invariance test for n0= 46
System e passes time invariance test for n0= 47
System e passes time invariance test for n0= 48
System e passes time invariance test for n0= 49
System e passes time invariance test for n0= 50
------------------------------------------------------------------
-------------------- TESTS WITH INPUT #2 ---------------------
```

```
--------------------- Test for System a: -----------------------
System a does not pass time invariance test for n0= -50
System a does not pass time invariance test for n0= -49
System a does not pass time invariance test for n0= -48
System a does not pass time invariance test for n0= -47
System a does not pass time invariance test for n0= -46
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System a does not pass time invariance test for n0= -22
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System a does not pass time invariance test for n0= -9
System a does not pass time invariance test for n0= -8
System a does not pass time invariance test for n0= -7
System a does not pass time invariance test for n0= -6
System a does not pass time invariance test for n0= -5
System a does not pass time invariance test for n0= -4
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System a does not pass time invariance test for n0= -2
System a does not pass time invariance test for n0= -1
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System a does not pass time invariance test for n0= 7
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System a does not pass time invariance test for n0= 10
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System a does not pass time invariance test for n0= 45
System a does not pass time invariance test for n0= 46
System a does not pass time invariance test for n0= 47
System a does not pass time invariance test for n0= 48
System a does not pass time invariance test for n0= 49
System a does not pass time invariance test for n0= 50
------------------------------------------------------------------
--------------------- Test for System b: ------------------------
System b does not pass time invariance test for n0= -50
System b does not pass time invariance test for n0= -49
System b does not pass time invariance test for n0= -48
System b does not pass time invariance test for n0= -47
System b does not pass time invariance test for n0= -46
System b does not pass time invariance test for n0= -45
System b does not pass time invariance test for n0= -44
System b does not pass time invariance test for n0= -43
System b does not pass time invariance test for n0= -42
System b does not pass time invariance test for n0= -41
System b does not pass time invariance test for n0= -40
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System b does not pass time invariance test for n0= -26
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System b does not pass time invariance test for n0= -8
System b does not pass time invariance test for n0= -7
System b does not pass time invariance test for n0= -6
System b does not pass time invariance test for n0= -5
System b does not pass time invariance test for n0= -4
System b does not pass time invariance test for n0= -3
System b does not pass time invariance test for n0= -2
System b does not pass time invariance test for n0= -1
System b does not pass time invariance test for n0= 1
System b does not pass time invariance test for n0= 2
System b does not pass time invariance test for n0= 3
System b does not pass time invariance test for n0= 4
System b does not pass time invariance test for n0= 5
System b does not pass time invariance test for n0= 6
System b does not pass time invariance test for n0= 7
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System b does not pass time invariance test for n0= 9
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System b does not pass time invariance test for n0= 44
System b does not pass time invariance test for n0= 45
System b does not pass time invariance test for n0= 46
System b does not pass time invariance test for n0= 47
System b does not pass time invariance test for n0= 48
System b does not pass time invariance test for n0= 49
System b does not pass time invariance test for n0= 50
------------------------------------------------------------------
---------------------- Test for System c: ------------------------
System c passes time invariance test for n0= -50
System c passes time invariance test for n0= -49
System c passes time invariance test for n0= -48
System c passes time invariance test for n0= -47
System c passes time invariance test for n0= -46
System c passes time invariance test for n0= -45
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System c passes time invariance test for n0= -42
System c passes time invariance test for n0= -41
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System c passes time invariance test for n0= -38
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System c passes time invariance test for n0= -8
System c passes time invariance test for n0= -7
System c passes time invariance test for n0= -6
System c passes time invariance test for n0= -5
System c passes time invariance test for n0= -4
System c passes time invariance test for n0= -3
System c passes time invariance test for n0= -2
System c passes time invariance test for n0= -1
System c passes time invariance test for n0= 1
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System c passes time invariance test for n0= 43
System c passes time invariance test for n0= 44
System c passes time invariance test for n0= 45
System c passes time invariance test for n0= 46
System c passes time invariance test for n0= 47
System c passes time invariance test for n0= 48
System c passes time invariance test for n0= 49
System c passes time invariance test for n0= 50
------------------------------------------------------------------
--------------------- Test for System d: -----------------------
System d passes time invariance test for n0= -50
System d passes time invariance test for n0= -49
System d passes time invariance test for n0= -48
System d passes time invariance test for n0= -47
System d passes time invariance test for n0= -46
System d passes time invariance test for n0= -45
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System d passes time invariance test for n0= -42
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System d passes time invariance test for n0= -40
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System d passes time invariance test for n0= -9
System d passes time invariance test for n0= -8
System d passes time invariance test for n0= -7
System d passes time invariance test for n0= -6
System d passes time invariance test for n0= -5
System d passes time invariance test for n0= -4
System d passes time invariance test for n0= -3
System d passes time invariance test for n0= -2
System d passes time invariance test for n0= -1
System d passes time invariance test for n0= 1
System d passes time invariance test for n0= 2
System d passes time invariance test for n0= 3
System d passes time invariance test for n0= 4
System d passes time invariance test for n0= 5
System d passes time invariance test for n0= 6
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System d passes time invariance test for n0= 42
System d passes time invariance test for n0= 43
System d passes time invariance test for n0= 44
System d passes time invariance test for n0= 45
System d passes time invariance test for n0= 46
System d passes time invariance test for n0= 47
System d passes time invariance test for n0= 48
System d passes time invariance test for n0= 49
System d passes time invariance test for n0= 50
------------------------------------------------------------------
---------------------- Test for System e: ------------------------
System e passes time invariance test for n0= -50
System e passes time invariance test for n0= -49
System e passes time invariance test for n0= -48
System e passes time invariance test for n0= -47
System e passes time invariance test for n0= -46
System e passes time invariance test for n0= -45
System e passes time invariance test for n0= -44
System e passes time invariance test for n0= -43
System e passes time invariance test for n0= -42
System e passes time invariance test for n0= -41
System e passes time invariance test for n0= -40
System e passes time invariance test for n0= -39
System e passes time invariance test for n0= -38
System e passes time invariance test for n0= -37
System e passes time invariance test for n0= -36
System e passes time invariance test for n0= -35
System e passes time invariance test for n0= -34
System e passes time invariance test for n0= -33
System e passes time invariance test for n0= -32
System e passes time invariance test for n0= -31
System e passes time invariance test for n0= -30
System e passes time invariance test for n0= -29
System e passes time invariance test for n0= -28
System e passes time invariance test for n0= -27
System e passes time invariance test for n0= -26
System e passes time invariance test for n0= -25
System e passes time invariance test for n0= -24
System e passes time invariance test for n0= -23
System e passes time invariance test for n0= -22
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System e passes time invariance test for n0= -19
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System e passes time invariance test for n0= -15
System e passes time invariance test for n0= -14
System e passes time invariance test for n0= -13
System e passes time invariance test for n0= -12
System e passes time invariance test for n0= -11
System e passes time invariance test for n0= -10
System e passes time invariance test for n0= -9
System e passes time invariance test for n0= -8
System e passes time invariance test for n0= -7
System e passes time invariance test for n0= -6
System e passes time invariance test for n0= -5
System e passes time invariance test for n0= -4
System e passes time invariance test for n0= -3
System e passes time invariance test for n0= -2
System e passes time invariance test for n0= -1
System e passes time invariance test for n0= 1
System e passes time invariance test for n0= 2
System e passes time invariance test for n0= 3
System e passes time invariance test for n0= 4
System e passes time invariance test for n0= 5
System e passes time invariance test for n0= 6
System e passes time invariance test for n0= 7
System e passes time invariance test for n0= 8
System e passes time invariance test for n0= 9
System e passes time invariance test for n0= 10
System e passes time invariance test for n0= 11
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System e passes time invariance test for n0= 14
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System e passes time invariance test for n0= 41
System e passes time invariance test for n0= 42
System e passes time invariance test for n0= 43
System e passes time invariance test for n0= 44
System e passes time invariance test for n0= 45
System e passes time invariance test for n0= 46
System e passes time invariance test for n0= 47
System e passes time invariance test for n0= 48
System e passes time invariance test for n0= 49
System e passes time invariance test for n0= 50
```

Output of Causality Test

```
--------------------- Test for System a: -----------------------
System a does not pass causality test for index 1
System a passes causality test for index 2
System a does not pass causality test for index 3
System a does not pass causality test for index 4
System a does not pass causality test for index 5
System a does not pass causality test for index 6
System a does not pass causality test for index 7
System a does not pass causality test for index 8
System a passes causality test for index 9
----------------------------------------------------------------
--------------------- Test for System b: -----------------------
System b does not pass causality test for index 1
System b passes causality test for index 2
System b does not pass causality test for index 3
System b does not pass causality test for index 4
System b does not pass causality test for index 5
System b passes causality test for index 6
System b passes causality test for index 7
System b passes causality test for index 8
System b passes causality test for index 9
----------------------------------------------------------------
--------------------- Test for System c: -----------------------
System c does not pass causality test for index 1
System c does not pass causality test for index 2
System c does not pass causality test for index 3
System c does not pass causality test for index 4
System c does not pass causality test for index 5
System c does not pass causality test for index 6
System c passes causality test for index 7
System c passes causality test for index 8
System c passes causality test for index 9
----------------------------------------------------------------
--------------------- Test for System d: -----------------------
System d passes causality test for index 1
System d passes causality test for index 2
System d passes causality test for index 3
System d passes causality test for index 4
System d passes causality test for index 5
System d passes causality test for index 6
System d passes causality test for index 7
System d passes causality test for index 8
System d passes causality test for index 9
----------------------------------------------------------------
--------------------- Test for System e: -----------------------
System e passes causality test for index 1
System e passes causality test for index 2
System e passes causality test for index 3
System e passes causality test for index 4
System e passes causality test for index 5
System e passes causality test for index 6
System e passes causality test for index 7
System e passes causality test for index 8
System e passes causality test for index 9
```