Assignment 3

The due date for submitting this assignment has passed.

Due on 2021-02-10, 23:59 IST.

As per our records you have not submitted this assignment.

Problem 1: Obtaining Step-Response from Transfer Function

Part-A: First Order System

A first order system is given by the following transfer function:

$$G = \frac{1.25}{5s+1}$$

Let us consider sampling time of $\Delta t = 1$. Compute and report the step-response coefficients for the above system. Please report the some of the elements of the step-response matrix, as asked below.

Hint: Step function is given by U(s)=1/s, and one uses partial fractions to compute the output. Please look into undergraduate control material to refresh concepts of computing step-response of a system.

1) S(1) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.224,0.229

0.2 points

2) S(2) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.408,0.416

[redacted]

Accepted Answers:
(Type: Range) 0.56,0.57

0.2 points

4) S(4) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.682,0.694

0.2 points

5) S(10) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.07,1.09

0.2 points

Part-B: First Order Plus Time Delay System

Repeat the above with a first-order-plus-time-delay system::

$$G = \frac{1.25}{5s+1}e^{-1.4s}$$

6) S(1) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 0

0.2 points

7) S(2) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.140,0.143

0.2 points

8) S(3) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.339,0.345

0.2 points

9) S(4) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.5,0.51

0.2 points

10) S(10) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.01,1.04

0.2 points

Problem-2: Impulse and Step Response Models

Part-A: Impulse Response from Input-Output Models

Consider the following input-output model:

$$y(k+1) = 0.5y(k) + 0.6u(k) + 0.2u(k-1)$$

Starting at origin (i.e., $u(-i) = 0$, $y(-i) = 0$, for positive i), compute the impulse response coefficients and report them below.

11) Impulse coefficient, H(1) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.595,0.605

0.25 points

12) Impulse coefficient, H(2) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.495,0.505

0.25 points

13) Impulse coefficient, H(3) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.248,0.252

0.25 points

14) Impulse coefficient, H(4) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.124,0.126

0.25 points

Part-B: Step Response Model

Using the results for the above system, compute and report the step response model coefficients below.

15) Step coefficient, S(1) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.595,0.605

0.25 points

16) Step coefficient, S(2) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.09,1.11

0.25 points

17) Step coefficient, S(3) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.335,1.365

0.25 points

18) Step coefficient, S(10) = _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.58,1.61

0.25 points

Problem-3: Step-Response for MIMO System (2 marks)

This is a subjective type question, and will be manually graded. Please use this link to the Problem Statement and upload your answers there as a single PDF file.