

Unit 5 - Week 3

Course outline

How does an NPTEL online course work?

Practice Assignment

Week 1

Week 2

Week 3

- Lecture 7.1: Dynamics of Positive Feedback systems
- Lecture 7.2: Doubling Time in Positive Feedback systems
- Lecture 7.3: Introduction to Modelling using Vensim software
- Lecture 8.1: Dynamics of Negative Feedback system: Introduction
- Lecture 8.2: Dynamics of Negative Feedback System: Modelling in Vensim
- Lecture 8.3: Negative Feedback Loop: Analytical equation
- Lecture 9.1: Dynamics of Negative Feedback System: Extension of Model
- Lecture 9.2: Zero-Value Goal system, Positive and Negative Loop Systems

Download Videos

Weekly Feedback

Quiz : Assignment 03

Study Material for Week 3

Assignment 03 - Detailed Solution

Week 4

Week 5

Week 6

Week 7

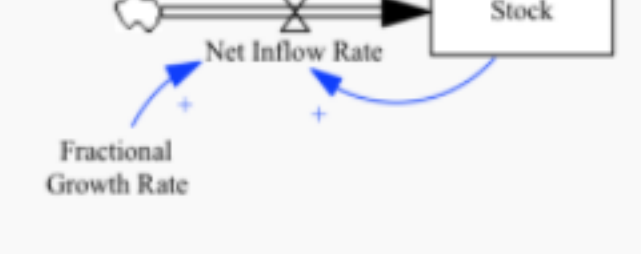
Week 8

Text Transcripts

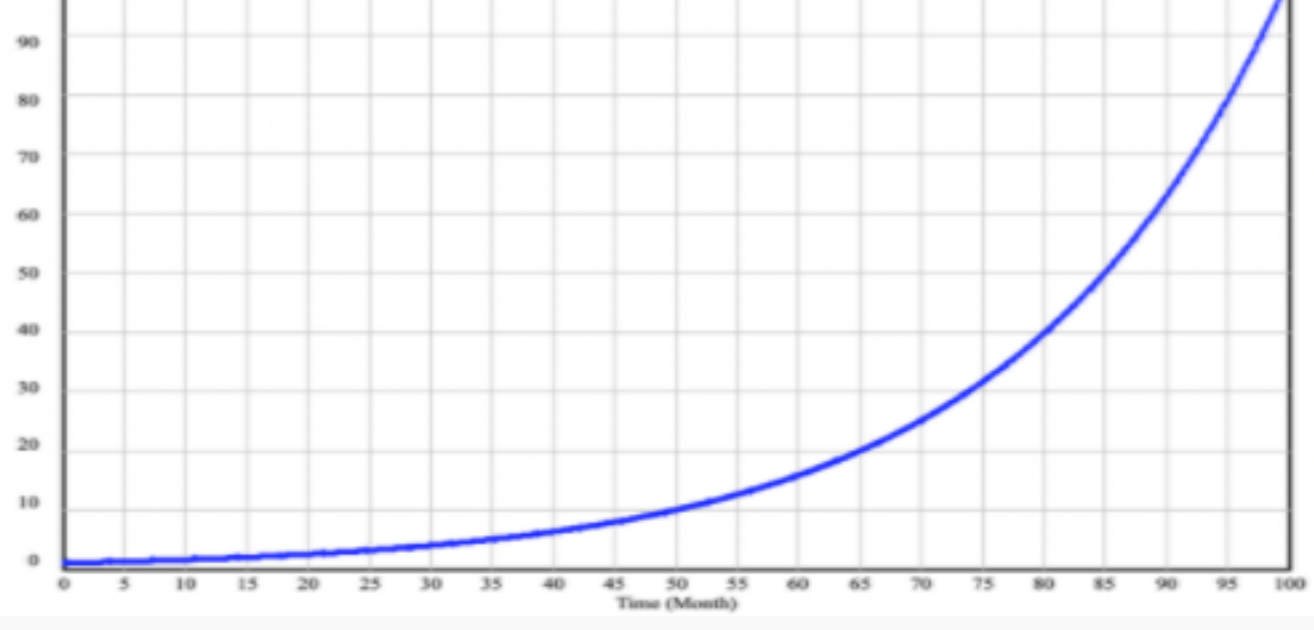
Assignment 03

The due date for submitting this assignment has passed. **Due on 2020-02-19, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Consider a Stock-flow model of a positive feedback system as shown in figure below.



Upon simulation, the following output graph of the Stock is observed. What is the doubling time (in months)?



Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 15

1 point
1 point

2) Select all the statements that are true:

- In a reinforcing loop model, the rate-level graph has a positive slope.
- In a balancing loop model, the rate-level graph has a negative slope.
- In a reinforcing loop model, the rate-level graph has a negative slope.
- In a balancing loop model, the rate-level graph has a positive slope.

No, the answer is incorrect.
Score: 0
Accepted Answers: In a reinforcing loop model, the rate-level graph has a positive slope. In a balancing loop model, the rate-level graph has a negative slope.

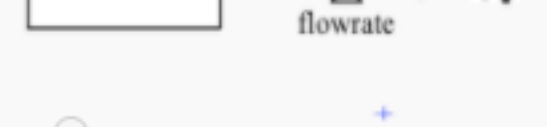
3) Suppose the doubling time of a positive feedback system decreases, rather than remaining constant. Then, this system will have more pronounced hyper-exponential growth, compared to a system with constant doubling time.

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers: True

1 point

4) Which of the following CLDs corresponds best to the SFD displayed below?

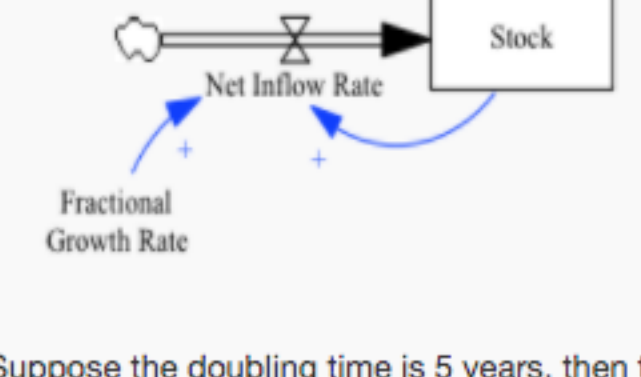


- Stock → flowrate → Stock
- Stock → flowrate → Stock
- Stock ← flowrate → Stock
- Stock ← flowrate → Stock

No, the answer is incorrect.
Score: 0
Accepted Answers: Stock ← flowrate → Stock

1 point

5) Consider a Stock-flow model of a positive feedback system as shown in figure below.



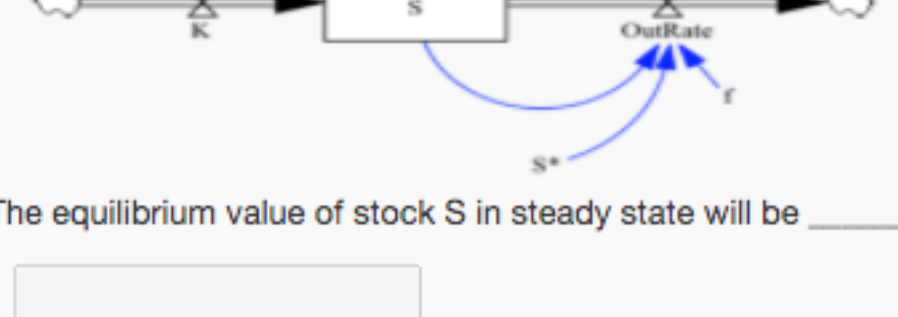
Suppose the doubling time is 5 years, then the fractional growth rate is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Range) 0.138,0.14

2 points

6) Consider the following negative feedback system with system compensation. Let Initial Value of S = 50 units, $f = 0.25/\text{time}$, $S^* = 100$ units, and $K=5$ units/time. Note: $\text{OutRate} = f(S-S^*)$.



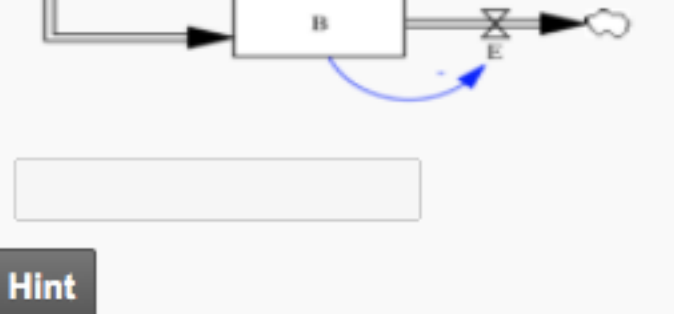
The equilibrium value of stock S in steady state will be _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 120

2 points

7) In the given SFD, how many positive feedback loops are present?



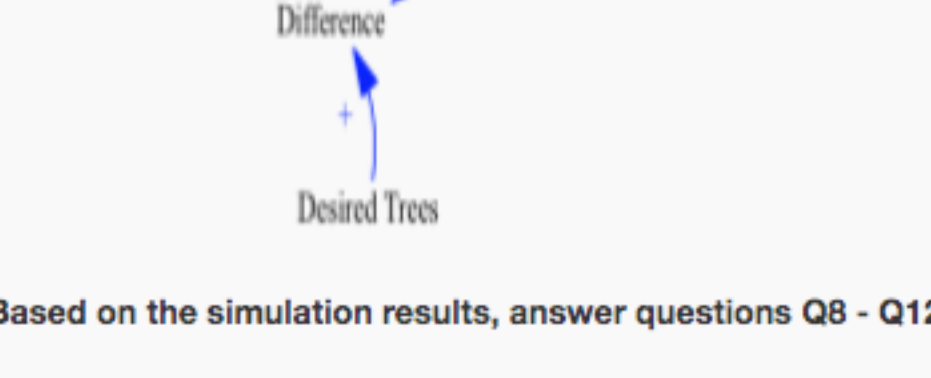
Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 3

2 points

8) Raj has a large farm in the outskirts of Nashik. Currently there are 500 trees in the farm. He typically sells about 8% of the trees (inventory) per year. To make best use of his farm, Raj desires to have approximately 5800 trees in his farm eventually. He designs a strategy to reach this goal over the next few years. Each year he will plant the number of trees equal to 30% of the difference between his goal of 5800 trees and his current inventory.

Build an SFD model of the above description in Vensim. Use following information for Model Settings:
FINAL TIME = 20
TIME STEP = 1
Units for Time = Year
Integration Type = Euler



Based on the simulation results, answer questions Q8 - Q12.

8) In Year 2, the number of trees, rounded to nearest integer, is: _____

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 3011 (Type: Numeric) 3012

1 point

9) In Year 2, the sales rate, rounded to nearest integer, is: _____

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 240 (Type: Numeric) 241

1 point

10) In Year 20, the number of trees, rounded to nearest integer, is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 4578 (Type: Numeric) 4579

1 point

11) In Year 20, the sales rate, rounded to nearest integer, is: _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Numeric) 366 (Type: Numeric) 367

1 point

12) In steady or equilibrium state, the Planting Rate equals the Sales Rate.

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers: True

1 point
1 point