Unit 6 - Week 4

Week 3

Week 4

SFD

Vensim

Lecture 10.1: Dynamic of

O Lecture 10.2: Dynamic of

Lecture 10.3: Dynamic of

Growth- Customisation in

Lecture 10.4: Dynamic of

O Lecture 11.1: Dynamic of

of systems exhibiting S-

Lecture 11.2: Dynamic of

 Lecture 11.3: Dynamic of Simple Structures: SFD of

Simple Structures: Second Structure of S-Shaped Growth

 Lecture 12.1: Diffusion Model and parameter estimation-I

O Lecture 12.2: Diffusion Model and parameter estimation-II

Lecture 13.1: Bass Diffusion

Lecture 13.2: Bass Diffusion

shaped growth

New Products

Model

Model(Contd.)

Download Videos

Weekly Feedback

Study Material for Week 4

Assignment 4 - Detailed

Solution

Week 5

Week 6

Week 7

Week 8

**Text Transcripts** 

Quiz : Quiz: Assignment 04

Simple Structures: S-Shaped

Simple Structures: S-Shaped

Growth- Conversion of CLD to

Simple Structures: S-Shaped

Simple Structures: Extension of model to include death rate

Simple Structures: Examples

Growth limited by Capacity

Course outline Quiz: Assignment 04 How does an NPTEL online The due date for submitting this assignment has passed. course work? Practice Assignment Set I: Week 1 Week 2 Underlying Equations:

As per our records you have not submitted this assignment. Consider the generic population growth with limiting factory model as shown in figure below. Population Capacity Ratio = Population P / Carrying Capacity C Effective frac birth rate = factional birth rate b \* Population Capacity Ratio

Net Birth Rate = Effective frac birth rate \* Population P

Net Birth Rate

Effective frac birth rate

The value of 'Population P' at year 100 is \_\_\_\_\_

No, the answer is incorrect.

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

No, the answer is incorrect.

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

Exponential Decay/ Goal Seek

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

Exponential Decay/ Goal Seek

value of 'Population P' at year 100 is

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

S-Shaped

Accepted Answers:

Linear

Score: 0

S-Shaped

 $AR = P^*c^*i^*A/N$ 

A = INTEGRAL (AR)P = INTEGRAL (-AR)

> Potential Adopters P

Build the above model in Vensim.

Values: N=100; c = 10/month; i=0.1

Exponential Growth

No, the answer is incorrect.

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

Exponential Growth

No, the answer is incorrect.

S-Shaped

No growth

Accepted Answers:

No growth

Month

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

Score: 0

Exponential Decay/ Goal Seeking

Exponential Decay/ Goal Seeking

17) Set III: New Product Diffusion DataSet

10

399

874

699

874

949

1249

1199

1299

999

1149

1149

949

549

449

499

374

424

249

174

74

55

32

No, the answer is incorrect.

Accepted Answers: (Type: Range) 0.38,0.40

S-Shaped

No growth

Accepted Answers:

Score: 0

Exponential Decay/ Goal Seeking

Exponential Decay/ Goal Seeking

S-Shaped

No growth

Accepted Answers:

Score: 0

Exponential Decay/ Goal Seeking

14) The behaviour over time of Adopters A, when  $A_0 = 40$  is:

15) The behaviour over time of Adopters A, when  $A_0 = 75$  is:

16) The behaviour over time of Adopters A, when  $A_0 = 0$  is:

Suppose the sales rate or adoption rate per month of a particular product is given below for 32 months. We have decided to model this as an innovation diffusion

model as shown in previous question. Using analytical logistic equation and the data given, estimate the value of c\*i. Assume N=16074,  $A_0$ =10,  $P_0$ =16064.

Accepted Answers: (Type: Numeric) 25

The behaviour over time of Adopters A, when  $A_0 = 1$  is:

Exponential Decay/ Goal Seeking

Model Settings: Final Time = 10;

Time Step = 0.125;

Answer Q12-Q16.

S-Shaped

No growth

Accepted Answers:

Score: 0

S-Shaped

Hint

Score: 0

Units for time = Months

Exponential Decay/ Goal Seeking

12) Set II :New Product Diffusion Dynamics

Adopters can also referred as Owners or Actual Customers

Market Saturation

contact rate c

 adoption fraction also referred as probability of buying contact rate also referred as population interaction

Adoption Rate also referred as Buying Rate or Conversion Rate

Consider the scenario of new product diffusion as discussed in the lectures: Potential Adopters also referred as Non-Owners, or Potential Customers;

The SFD model of the above scenario is given in Figure below, with the underlying equations:

Total market or Total population, N = P + A (note: Initial values of P and A to be such that  $P_0 + A_0 = N$ )

Adoption Rate

Total Population N

13) Suppose  $A_0 = 1$ , then, analytically, the maximum or peak value of adoption rate AR will be

probability of buying i

S-Shaped

Accepted Answers: Exponential Growth

Linear

Score: 0

Exponential Decay/ Goal Seeking

10) The behaviour of 'Population P' over time from 0 to 100 years is:

Accepted Answers: (Type: Range) 34,35

S-Shaped

Accepted Answers:

Linear

Score: 0

Hint

Score: 0

O Exponential Decay/ Goal Seek

Accepted Answers: (Type: Numeric) 650

The value of 'Population P' at year 100 is \_\_

8) The behaviour of 'Population P' over time is:

S-Shaped

Accepted Answers:

Linear

Score: 0

Hint

Score: 0

Exponential Decay/ Goal Seek

Accepted Answers: (Type: Numeric) 0

Accepted Answers: (Type: Numeric) 650

S-Shaped

Accepted Answers:

Linear

Score: 0

S-Shaped

Hint

Hint

Score: 0

Score: 0

Accepted Answers: (Type: Numeric) 47

The Net Rate is maximum in year \_

The behaviour of 'Population P' over time is:

Exponential Decay/ Goal Seeking

The value of 'Population P' at year 100 is \_

The Net Rate is maximum in year \_

6) The behaviour of 'Population P' over time is:

Accepted Answers:

(Type: Range) 649,650

NetRate\*

Population P

Population Capacity Ratio

Carrying Capacity C

Question Set A: Suppose the initial value of 'Population P' = 2. Answer the questions Q1-Q3.

Question Set B: Suppose the initial value of 'Population P' = 600. Answer the questions Q4-Q6.

Question Set C: Suppose the initial value of 'Population P' = 1500. Answer the questions Q7-Q8.

9) Question Set D: Suppose the initial value of 'Population P' = 2, and 'fractional birth rate b'= 0.1. Simulate for 100 months Answer the questions Q9-Q11. The

11) Suppose we run the model for more than 100 months (say for 500 month), then the expected behaviour over time of 'Population P' will be:

Adopters A

Death Rate

Build an SFD model of the same in in Vensim, and based on the simulation results, answer the Sets A-D questions.

fractional death rate

Death Rate = fractional death rate \* Population P

NetRate = Net Birth Rate - Death Rate

Use following information for Model Setting:

Carrying Capacity C = 1000

fractional death rate d = 0.07

fractional birth rate b = 0.2

FINAL TIME = 100

Units for Time = Month

Integration Type = Euler

fractional birth rate b

Hint

Hint

Score: 0

Score: 0

TIME STEP = 1

Progress Mentor

0.5 points

0.5 points

0.5 points

0.4 points

0.5 points

2 points

About the Course Ask a Question

Announcements

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Due on 2020-02-26, 23:59 IST.