

MAC1105 Week 9 Discussion

Module 9: Modeling Answer Sheet

October 17, 2019

(a) Determine if each of the following data sets can be modeled using a linear function. Which restricted domain (Subset of natural numbers, subset of integers, subset of real numbers, or all real numbers) is reasonable for each case?

(i)

Time (s)	8	32	64	256
Distance (ft)	24	96	192	768

Answer: Linear, restricted domain: Subset of real numbers

(ii)

Time (hours)	0	1	2	4	6	8	11
Temperature (°F)	82	83	85	85	81	76	73

Answer: Not-linear, restricted domain: all real numbers

(iii)

Age	21	22	23	24	25	26	27
Golf Score	10	3	-1	5	2	-1	-6

Answer: Non-linear, restricted domain: integers

(iv)

Year	1960	1970	1980	1990	2000	2010
Population	15964	13813	11961	9515	7776	5823

Answer: Linear, restricted domain: natural numbers

(b) Two trains leave a station at the same time, each traveling 40 kilometers per hour.

(i) Construct a linear model that describes train A's distance from the station (D) as a function of the seconds that have passed (s). $D(s) = \dots$

Answer: $D(s) = \frac{1}{90}s$

(ii) Construct a linear model that describes the total distance of the trains from each other (T_1) as a function of the seconds that have passed (s) if one train was traveling north and the other south. $T_1(s) = \dots$

Answer: $T_1(s) = \frac{1}{45}s$

(iii) Construct a linear model that describes the total distance of the trains from each other (T_2) as a function of the seconds that have passed (s) if one train was traveling south and the other west. $T_2(s) = \dots$

Answer: $T_2(s) = \sqrt{\frac{1}{4050}}s \approx 0.0157s$