Assignment on Time Series Analysis & Forecasting

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1. Below are the net sales in $ million for Home Depot, Inc. and its subsidiaries from 2015 to 2024.

Table 1: Net sales of different years

Year	Net Sales ($)	Year	Net Sales ($)
2015	50,600	2020	156,700
2016	67,300	2021	201,400
2017	80,800	2022	227,300
2018	98,100	2023	256,300
2019	124,400	2024	280,900

Note: **Add last three digits of your ID with Net Sales**

i) Determine the least square equation. Based on this information, what are the estimated sales for 2030?

ii) Plot Net Sales and Trend Line

2. It appears that the imports of carbon black have been increasing by about 10 percent annually.

Table 2: Amount of Carbon Block imported in different years.

Year	Imports of Carbon Block (thousands of tons)	Year	Imports of Carbon Block (thousands of tons)
2011	124	2018	2463
2012	175	2019	3358
2013	306	2020	4181
2014	524	2021	5388
2015	714	2022	8027
2016	1052	2023	10587
2017	1638	2024	13537

Note: **Add last three digits of your ID with imports of Carbon Block**

i) Determine the logarithmic trend.

ii) Find the annual rate of increase.

iii) Estimate imports for the year 2030.

3. The quarterly production of pine lumber, in millions of board feet, by Northwest lumber since 2018 is:

Table 3: Productions in different quarters of several years

Year	Quarter	Production	Year	Production	Sales	Year	Quarter	Production
2018	Winter	90	2021	Winter	201	2024	Winter	265
	Spring	85		Spring	142		Spring	185
	Summer	56		Summer	110		Summer	142
	Fall	102		Fall	274		Fall	333
2019	Winter	115	2022	Winter	251	2025	Winter	282
	Spring	89		Spring	165		Spring	175
	Summer	61		Summer	125		Summer	157
	Fall	110		Fall	305		Fall	350
2020	Winter	165	2023	Winter	241	2024	Winter	290
	Spring	110		Spring	158		Spring	201
	Summer	98		Summer	132		Summer	187
	Fall	248		Fall	299		Fall	400

Note: **Add last three digits of your ID with number of Productions**

i) Develop a seasonal index for each quarter and interpret it.
ii) Project the production for 2030 and also find the base year production.
iii) Plot the original data, deseasonalize data, and interpret.