Time Series Analysis :—

1) What is time series?

2) Few examples of it.

3) What do we mean by time series analysis

3. a) Different components of time series.

3. b) Decomposing a time series into its components

3. c) Forecasting Principles. (Basics)

4) Forecasting methods.
(Statistical methods of time series forecasting)

5) Python coding examples.

What is time series? Time series are nothing but measurements taken in chronological order.

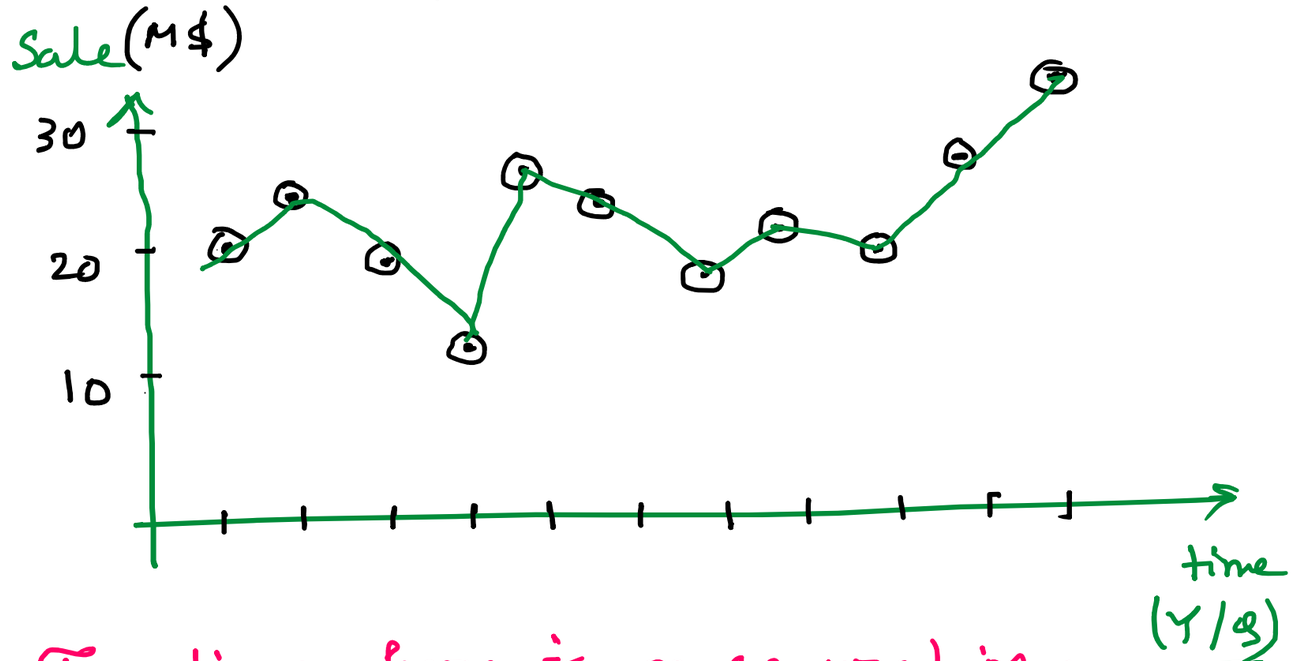
time — measurement(s)

Ex 1.– Sale of a division of a product company in different quarters of different years.

	Y	Qtr.	Sale (M$)
1.	2020	Q1	20
2.	2020	Q2	22
3.	2020	Q3	17.5
4.	2020	Q4	13.2
5.	2021	Q1	25.1
6.	2021	Q2	23.2
7.	2021	Q3	18.5
8.	2021	Q4	22.7
9.	2022	Q1	19.8
10.	2022	Q2	23.4
11.	2022	Q3	29.7

3 month

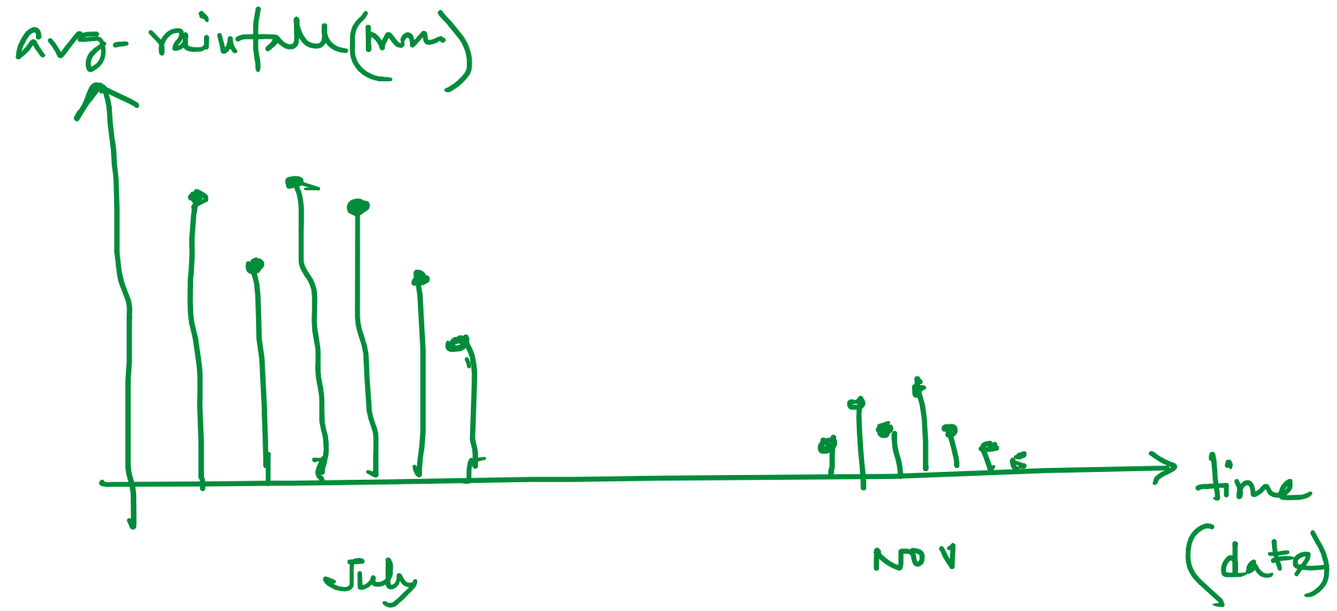
3 month



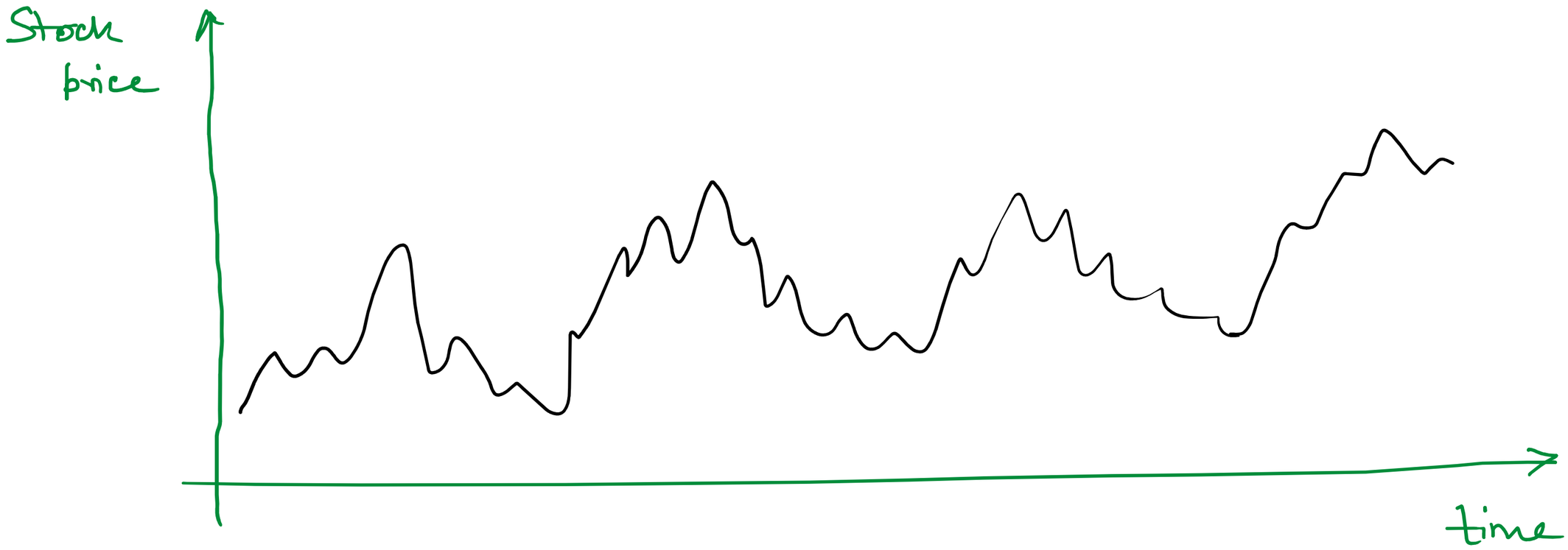
The time here is measured in Year/Qtr.

Ex2:- Daily average rain-fall in a region (North Mumbai)

time (date)	avg. rainfall (mm)
⋮	
1st NOV, 2022	20
2nd NOV, 2022	25
3rd NOV, 2022	13
4th NOV, 2022	10
5th NOV, 2022	2
6th NOV, 2022	15
7th NOV, 2022	1
8th NOV, 2022	0
⋮	⋮

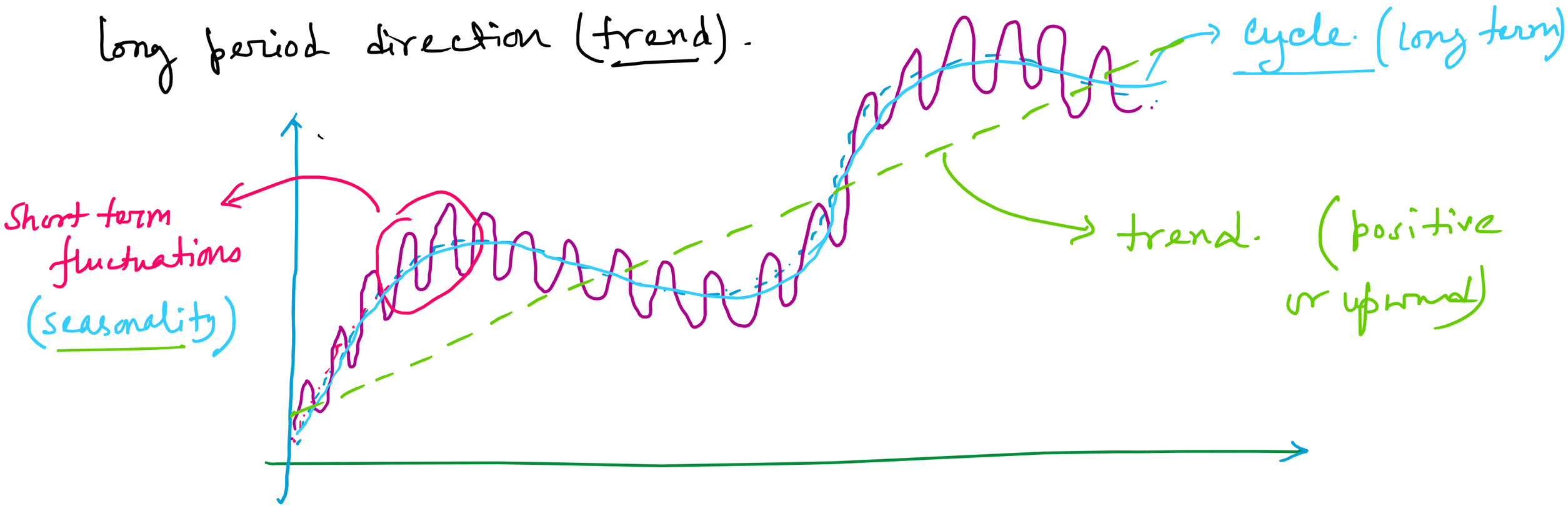


Ex2:- Stock price of Infosys in last one year (last traded price in each day/hour/min)



Definition of time series :-

A time series is a collection of observations made sequentially through time, whose dynamics is often characterized by short / long period fluctuations (seasonality / cycles) and/or long period direction (trend).



$x_t \longrightarrow$ observation/measurement at t^{th} time instance

$\{ x_1, x_2, x_3, \ldots\ldots, x_t, x_{t+1}, \ldots\ldots \} \longrightarrow$ Univariate time series.

t	x	y	z
t_1	x_{t_1}	y_{t_1}	z_{t_1}
t_2	x_{t_2}	y_{t_2}	z_{t_2}
⋮	⋮	⋮	⋮
t_n	x_{t_n}	y_{t_n}	z_{t_n}

multivariate time series.