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## 1 Comprehensive Sales Analysis for Inventory Management

### 1.1 Overview

This project focuses on analyzing the sales of products in inventory, with data provided by \*\*\*\*. The dataset is organized in monthly Excel files. The project involves cleaning the data to ensure accuracy and consistency, performing exploratory data analysis (EDA) to uncover patterns and insights, and potentially creating a comprehensive database to streamline future analyses.

### 1.2 Goal

The goal of the project is to gain a detailed understanding of sales trends and product performance over the specified periods, utilizing data cleaning and exploratory data analysis (EDA) techniques. The approach aims to provide descriptive insights for improved decision-making.

### 1.3 The Data

Due to privacy considerations for our customers, not all data for every month is included or displayed in this analysis. We have selectively chosen the information presented to ensure confidentiality while still providing meaningful insights.

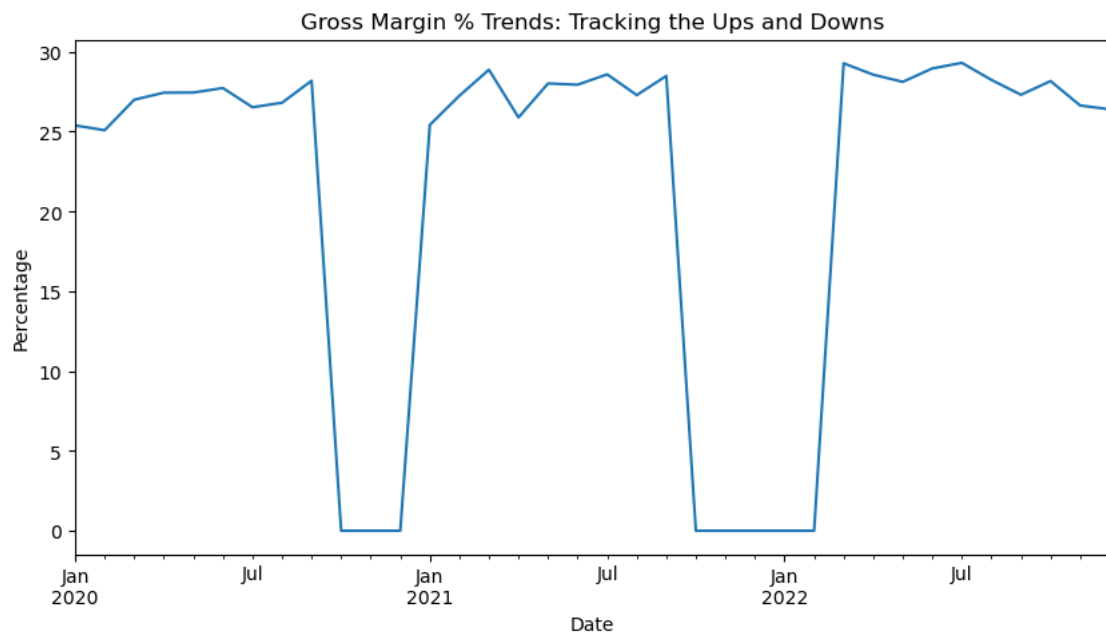
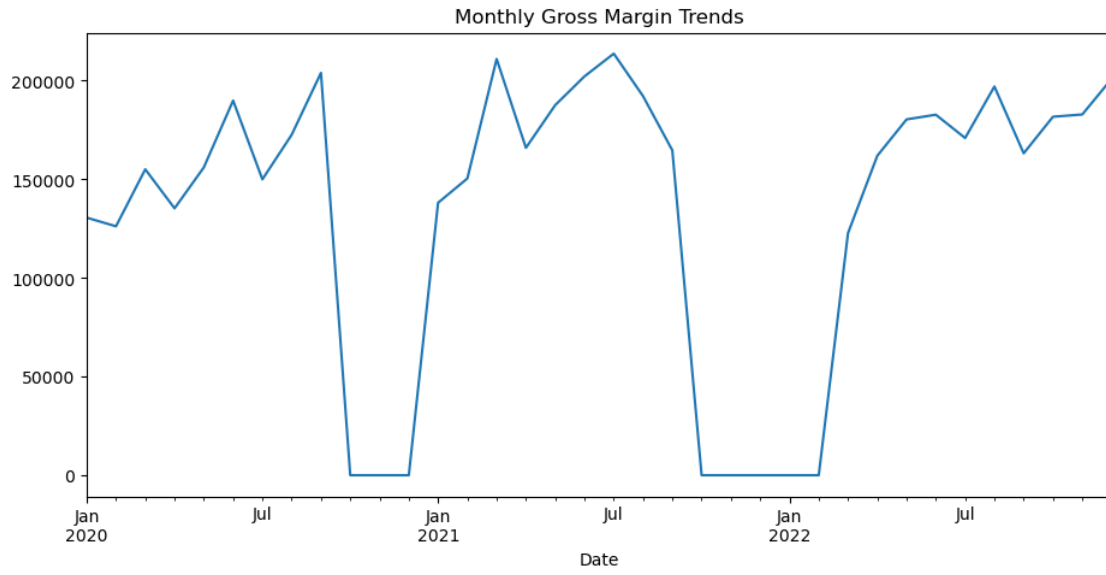
#### Data Column Reference

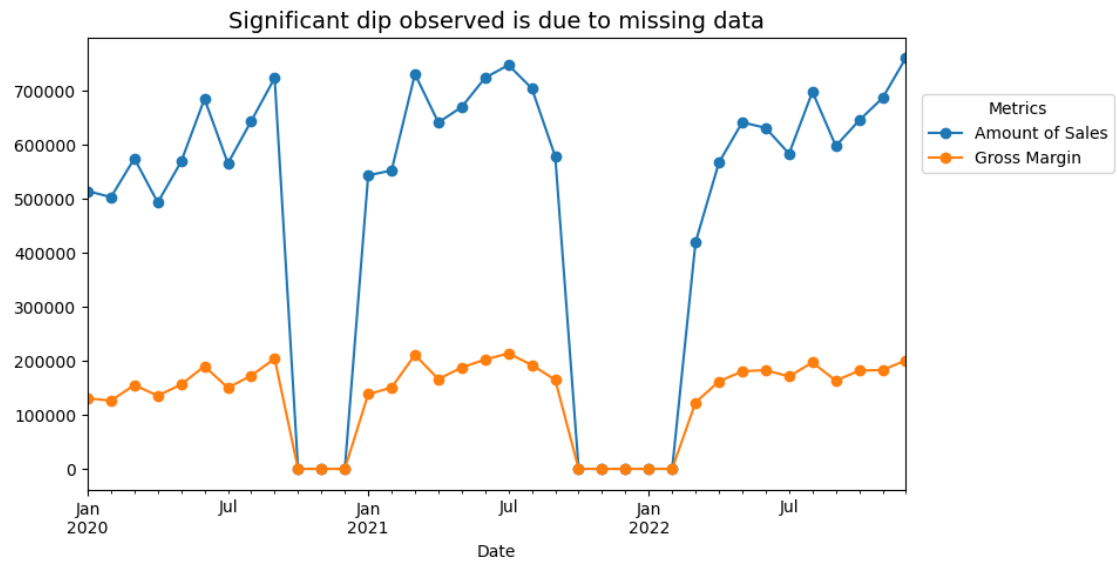
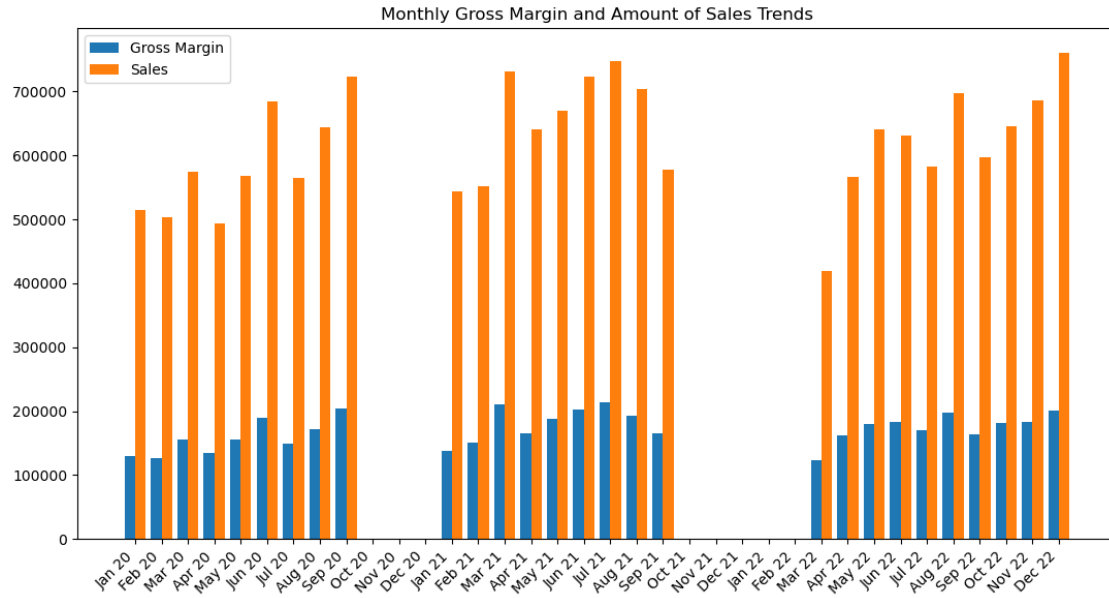
Variable	Type	Description
Inventory	Object	Code and description of products sold
Qty	Numeric	Quantity sold
Amount	Numeric	Amount sold in dollars
% of Sales	Numeric	Percentage of total sales attributed to the amount sold of a particular product. Computed as ratio of amount sold over total sales for the month
Avg Price	Numeric	Average price in dollars computed dividing amount sold by quantity
COGS	Numeric	Cost of Goods Sold in dollars

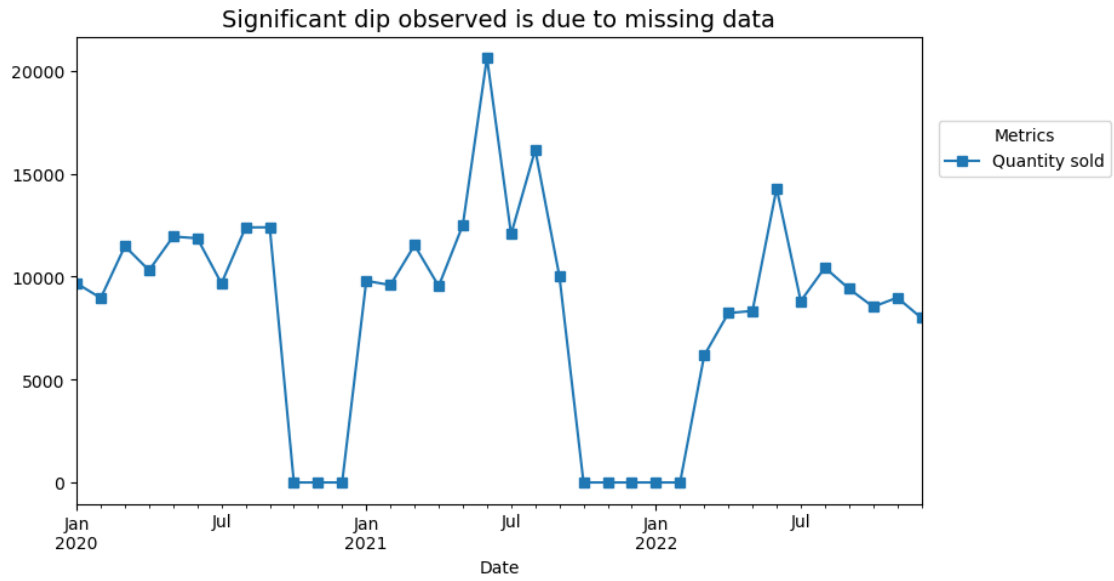
Variable	Type	Description
Avg COGS	Numeric	Average cost of goods sold in dollars computed dividing COGS by quantity
Gross Margin	Numeric	Gross profit computed by subtracting COGS from amount sold
Gross Margin %	Numeric	Percentage of gross margin of a particular product. Computed as the proportion of gross margin to price

## 1.4 Monthly Inventory Totals

Date	Qty	Amount	Pct Sales	Avg Price	COGS	Avg COGS	Gross Margin	Pct Gross Margin
<b>January 2020</b>	9,669.00	514,028.64	99.91	53.16	383,494.25	39.66	130,534.39	25.39
<b>February 2020</b>	8,958.00	502,729.03	99.98	56.12	376,573.03	42.04	126,156.00	25.09
<b>March 2020</b>	11,474.00	574,208.60	99.89	50.04	419,165.41	36.53	155,043.19	27.00
<b>April 2020</b>	10,303.00	492,861.10	99.93	47.84	357,605.93	34.71	135,255.17	27.44
<b>May 2020</b>	11,944.00	568,389.83	99.94	47.59	412,368.94	34.53	156,020.89	27.45
<b>June 2020</b>	11,858.00	684,648.74	99.95	57.74	494,764.49	41.72	189,884.25	27.73
<b>July 2020</b>	9,665.00	565,234.37	99.99	58.48	415,287.11	42.97	149,947.26	26.53
<b>August 2020</b>	12,389.00	643,739.51	99.81	51.96	471,184.85	38.03	172,554.66	26.81
<b>September 2020</b>	12,391.00	723,252.54	100.01	58.37	519,342.16	41.91	203,910.38	28.19
<b>October 2020</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>November 2020</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>December 2020</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>January 2021</b>	9,793.00	543,207.21	100.11	55.47	320,289.62	32.71	138,083.16	25.42
<b>February 2021</b>	9,587.00	551,964.01	99.94	57.57	309,984.66	32.33	150,411.68	27.25
<b>March 2021</b>	11,525.00	730,615.21	99.95	63.39	519,646.44	45.09	210,968.77	28.88
<b>April 2021</b>	9,535.00	640,849.47	99.94	67.21	474,926.11	49.81	165,923.36	25.89
<b>May 2021</b>	12,505.00	669,525.95	99.95	53.54	481,957.28	38.54	187,568.67	28.02
<b>June 2021</b>	20,629.00	723,546.18	99.89	35.07	521,401.01	25.28	202,145.17	27.94
<b>July 2021</b>	12,055.75	747,199.59	99.78	61.98	533,538.21	44.26	213,661.38	28.59
<b>August 2021</b>	16,156.00	703,865.40	99.93	43.57	511,749.11	31.68	192,116.29	27.29
<b>September 2021</b>	10,025.00	577,881.48	99.91	57.64	413,216.70	41.22	164,664.78	28.49
<b>October 2021</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>November 2021</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>December 2021</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00







## 1.5 Yearly Insights: Uncovering Key Statistics

### 1.5.1 Amount of Sales

Date	Amount					
	sum	mean	std	median	min	max
2020-12-31	5269092.36	1007.667309	5131.579803	219.45	0.00	164082.32
2021-12-31	5888654.50	1199.318635	7072.916068	273.30	-230.77	191829.99
2022-12-31	6227851.10	1359.495983	8300.187142	275.25	0.00	310228.20

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### 1.5.2 Cost of Goods Sold

Date	COGS					
	sum	mean	std	median	min	max
2020-12-31	3849786.17	736.237554	3998.251799	146.70	-4.56	128320.00
2021-12-31	4086709.14	832.323654	5181.606958	159.84	-0.04	145362.50
2022-12-31	4483812.75	978.784709	6070.913532	185.47	-244.20	227352.49

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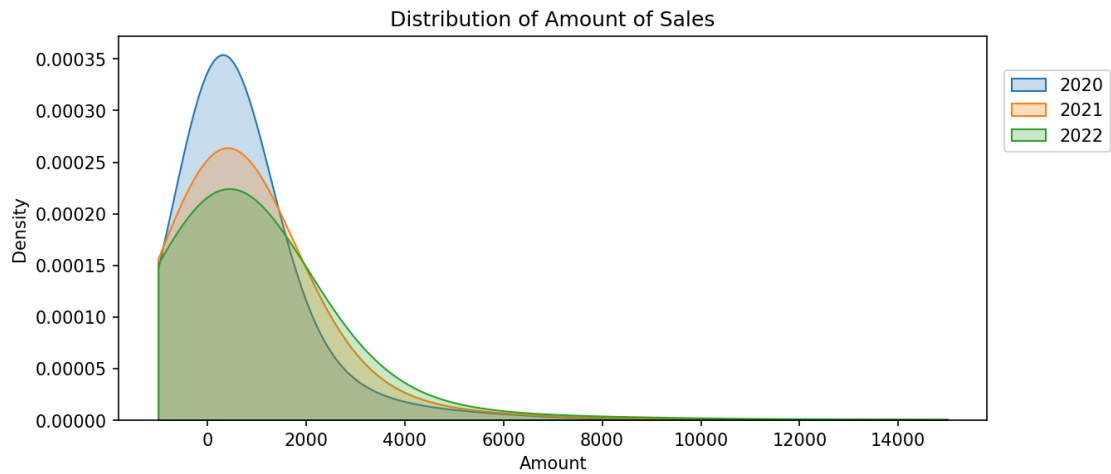
### 1.5.3 Quantity Sold

Date	Qty					
	sum	mean	std	median	min	max
2020-12-31	98651.00	18.866131	46.941621	5.0	0.0	1135.0
2021-12-31	111810.75	22.772047	151.189947	6.0	-5.0	9280.0
2022-12-31	91154.00	19.898275	83.596539	5.0	0.0	4656.0

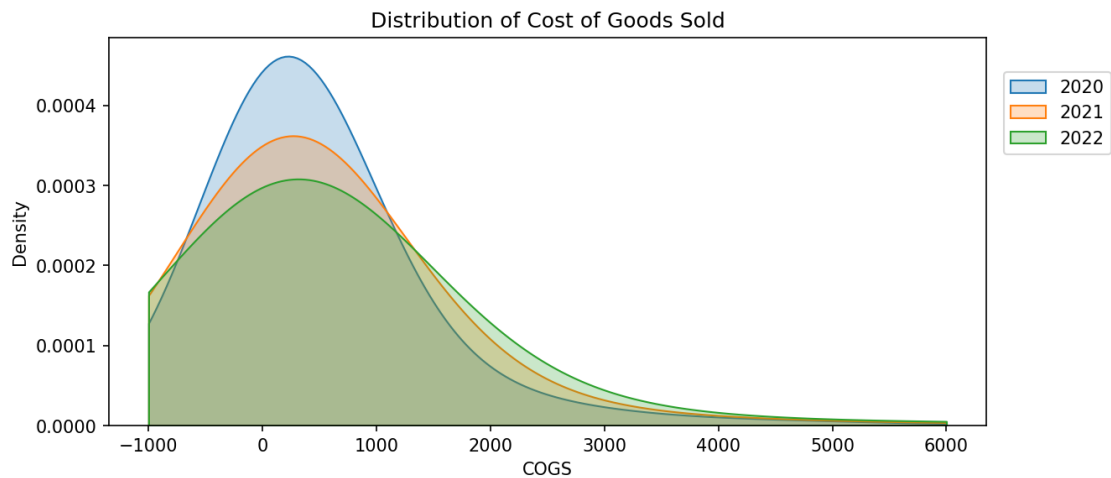
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## 1.6 Yearly amount of Sales & cost of goods sold: a comparative insight



More sales in 2020 for amounts between \$0 and \$2000 compared to 2021 and 2022. In 2021 and even more in 2022 there are more sales for amounts between \$2000 and \$5000.



## 1.7 Product-level insights: uncovering trends beyond the totals

		count	mean	std	min	25%	50%	75%	max
Code	Date								
1000	2020	1.0	143.960000	NaN	143.96	143.9600	143.960	143.9600	143.96
	2021	4.0	44.987500	17.995000	35.99	35.9900	35.990	44.9875	71.98
	2022	3.0	56.646667	28.608199	35.99	40.3200	44.650	66.9750	89.30
1003	2020	2.0	125.055000	98.252487	55.58	90.3175	125.055	159.7925	194.53
	2021	5.0	138.480000	50.897411	83.37	96.0900	138.950	166.7400	207.25
	2022	4.0	452.167500	724.732452	0.00	102.3300	136.860	486.6975	1534.95

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Yearly total amount of sales by product:

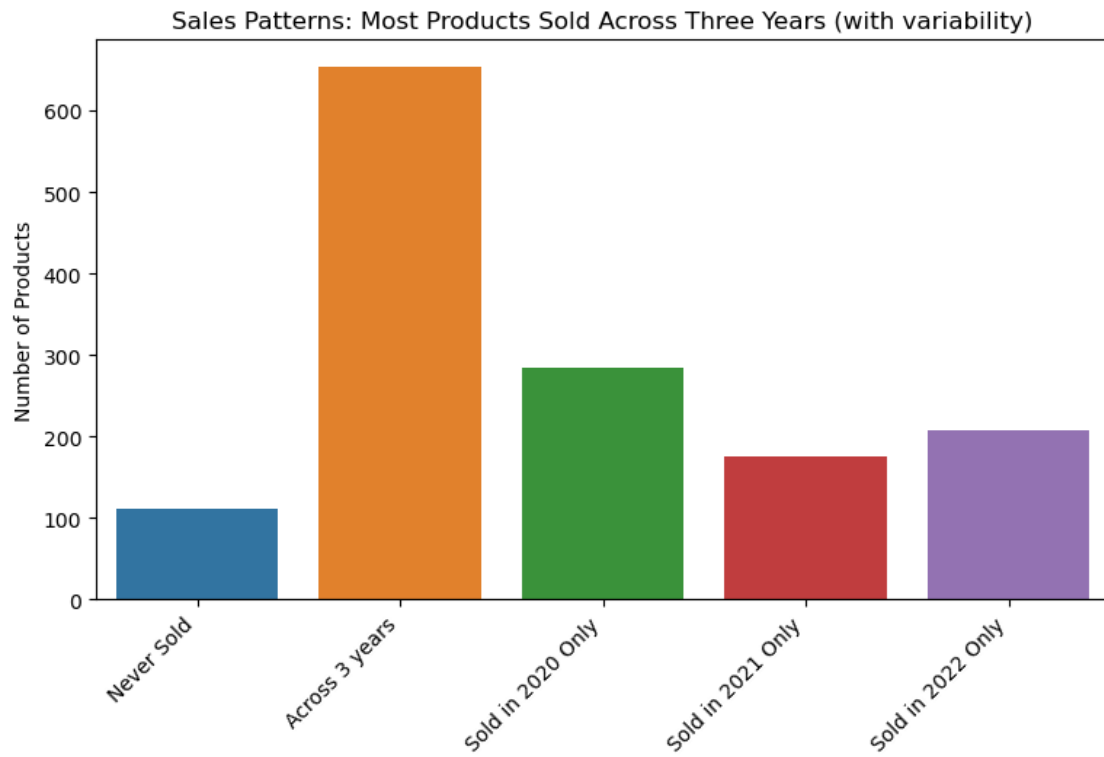
	Code	Sales_2020	Sales_2021	Sales_2022
0	1000	143.96	179.95	169.94
1	1003	250.11	692.40	1808.67
2	1006	3941.63	358.33	0.00
3	1009	606.58	1629.72	0.00
4	1009*	0.00	0.00	1484.88
...	...	...	...	...
1844	S4582	0.00	75.00	0.00
1845	S4619	0.00	157.68	0.00
1846	S4703	0.00	0.00	125.40
1847	S8019	394.25	0.00	0.00
1848	Spectros	0.00	0.00	0.00

Further analysis

	Code	Sales_2020	Sales_2021	Sales_2022
745	2598	306.82	-33.35	13.34
1434	4438	855.00	-98.30	0.00



Category	Number of Products
Never Sold	112
Across 3 years	654
Sold in 2020 Only	284
Sold in 2021 Only	175
Sold in 2022 Only	208



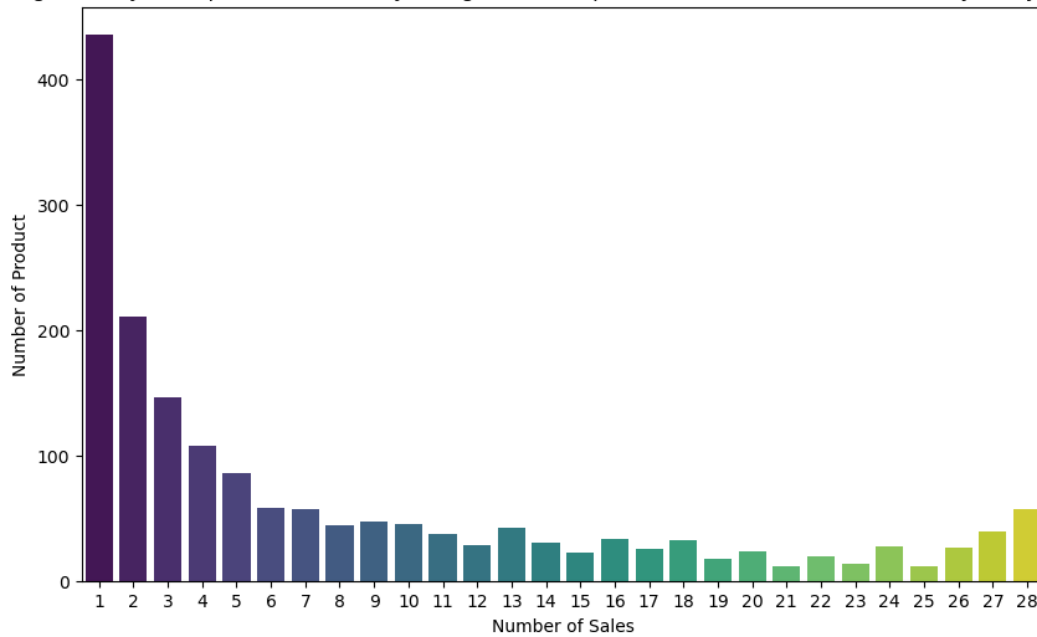

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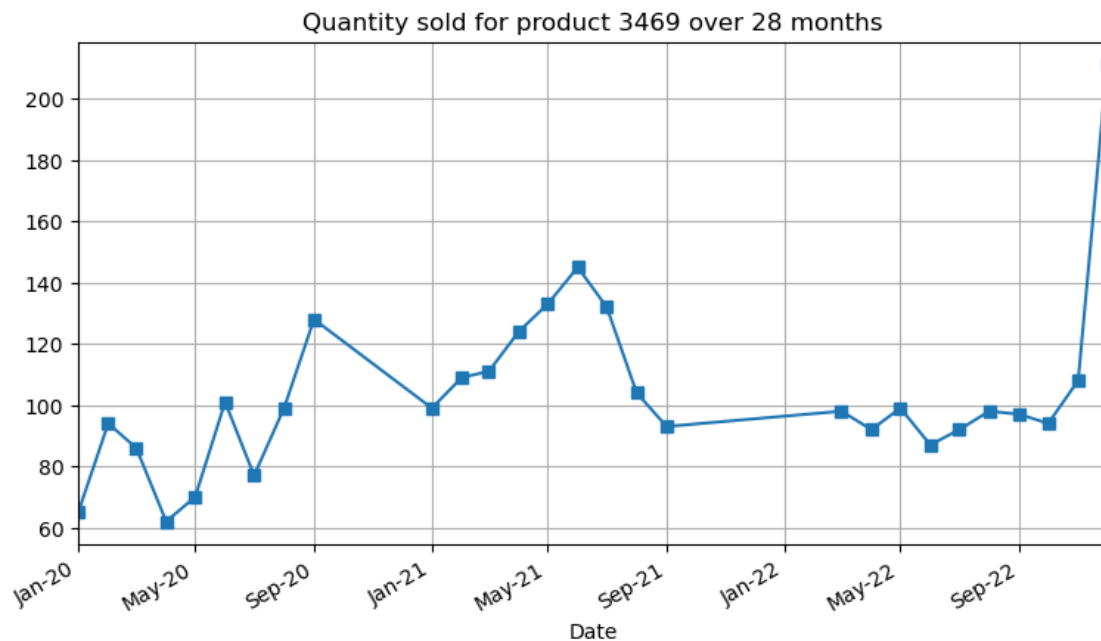
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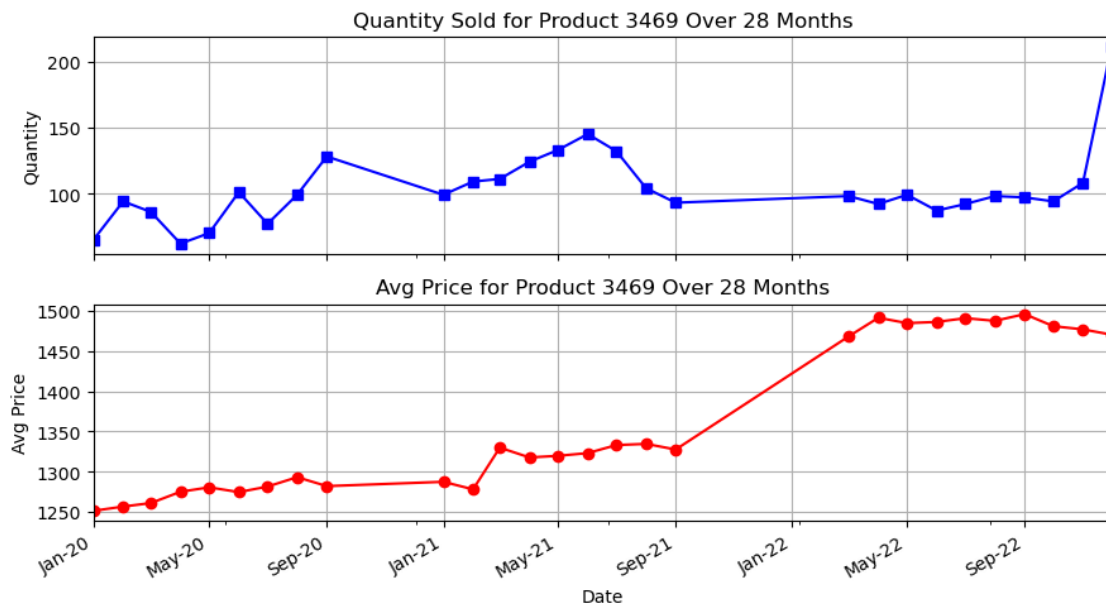
## 1.8 Transitioning from Infrequent Sales: Analyzing products with only one sale to products consistently selling every month

Significantly more products have only a single sale compared to those that sold consistently every month



### 1.8.1 Spotlight on Success: Analyzing quantity sold for products with 28 consecutive months of sales





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