Step 1: Import necessary libraries and load the dataset

In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

data = pd.read_excel("Omnify-Analyst-Intership-Task.xlsx")
```

Step 2: Check the first few rows of the dataset and get an overview of the dataset

In [2]:

```
data.head()
```

Out[2]:

	Week	Campaign	Ad group	Keyword type	Search Keyword
0	2021-01-25	EK_Generic_Swimming	Pool_Reservation_System_Exact	Exact	pool reservation system
1	2021-01-25	EK_Generic_Swimming	Pool_Booking_App_Exact	Exact	pool booking app
2	2021-01-25	EK_Generic_Quad-Tok_Yoga	Yoga_Studio_Booking_Software_Broad	Broad	yoga studio booking software
3	2021-01-25	EK_Generic_Swimming	Pool_Scheduling_Software_Phrase	Phrase	pool scheduling software
4	2021-01-25	EK_Generic_Swimming_UK	Pool_Reservation_Software_Broad	Broad	pool reservation software

In [3]:

```
print(data.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 418 entries, 0 to 417
Data columns (total 14 columns):
 #   Column          Non-Null Count  Dtype         
---  ------          --------------  -----         
 0   Week            418 non-null    datetime64[ns]
 1   Campaign        418 non-null    object        
 2   Ad group        418 non-null    object        
 3   Keyword type    418 non-null    object        
 4   Search Keyword  412 non-null    object        
 5   Currency        418 non-null    object        
 6   Clicks          418 non-null    int64         
 7   Impressions     418 non-null    int64         
 8   Cost ($)        418 non-null    float64       
 9   Leads           418 non-null    int64         
 10  Prospects       418 non-null    int64         
 11  Payment ($)     8 non-null      object        
 12  Payment Date    8 non-null      datetime64[ns]
 13  Country         418 non-null    object        
dtypes: datetime64[ns](2), float64(1), int64(4), object(7)
memory usage: 45.8+ KB
None
```

In [4]:

```
print(data.describe())
```

```
           Clicks  Impressions    Cost ($)       Leads   Prospects
count  418.000000   418.000000  418.000000  418.000000  418.000000
mean     0.925837    16.662679    6.671483    0.028708    0.050239
std      1.900840    46.743636   14.253019    0.167185    0.285312
min      0.000000     0.000000    0.000000    0.000000    0.000000
25%      0.000000     1.000000    0.000000    0.000000    0.000000
50%      0.000000     3.000000    0.000000    0.000000    0.000000
75%      1.000000    12.000000    6.800000    0.000000    0.000000
max     12.000000   357.000000   92.090000    1.000000    3.000000
```

In [5]:

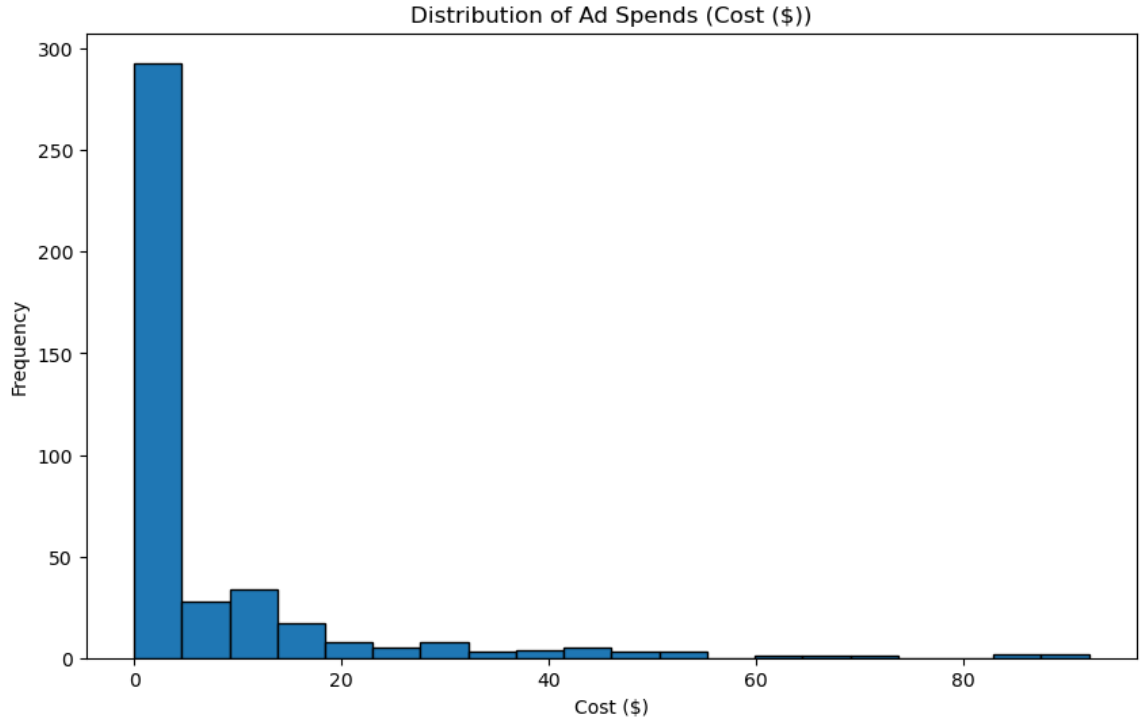
```
print(data.isnull().sum())
```

```
Week                0
Campaign            0
Ad group            0
Keyword type        0
Search Keyword      6
Currency            0
Clicks              0
Impressions         0
Cost ($)            0
Leads               0
Prospects           0
Payment ($)       410
Payment Date      410
Country             0
dtype: int64
```

Step 3: Data Visualization - Distribution of 'Cost ($)', 'Impressions', 'Clicks', and 'Prospects'

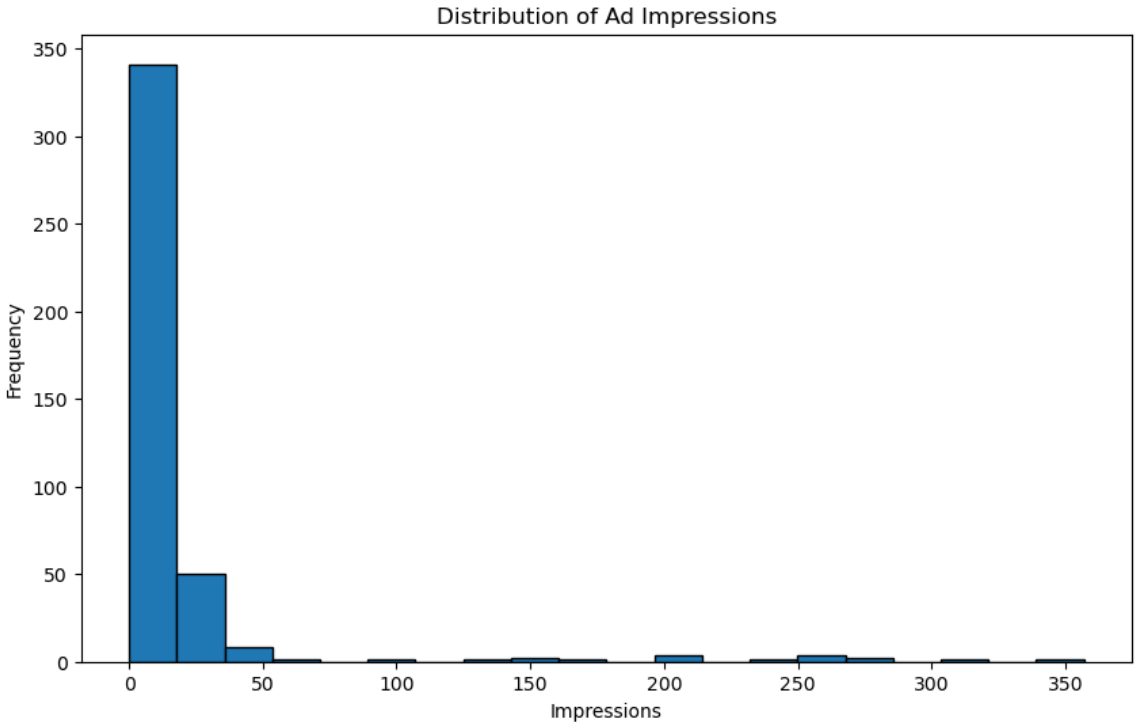
In [6]:

```
plt.figure(figsize=(10, 6))
plt.hist(data['Cost ($)'], bins=20, edgecolor='k')
plt.xlabel('Cost ($)')
plt.ylabel('Frequency')
plt.title('Distribution of Ad Spends (Cost ($))')
plt.show()
```



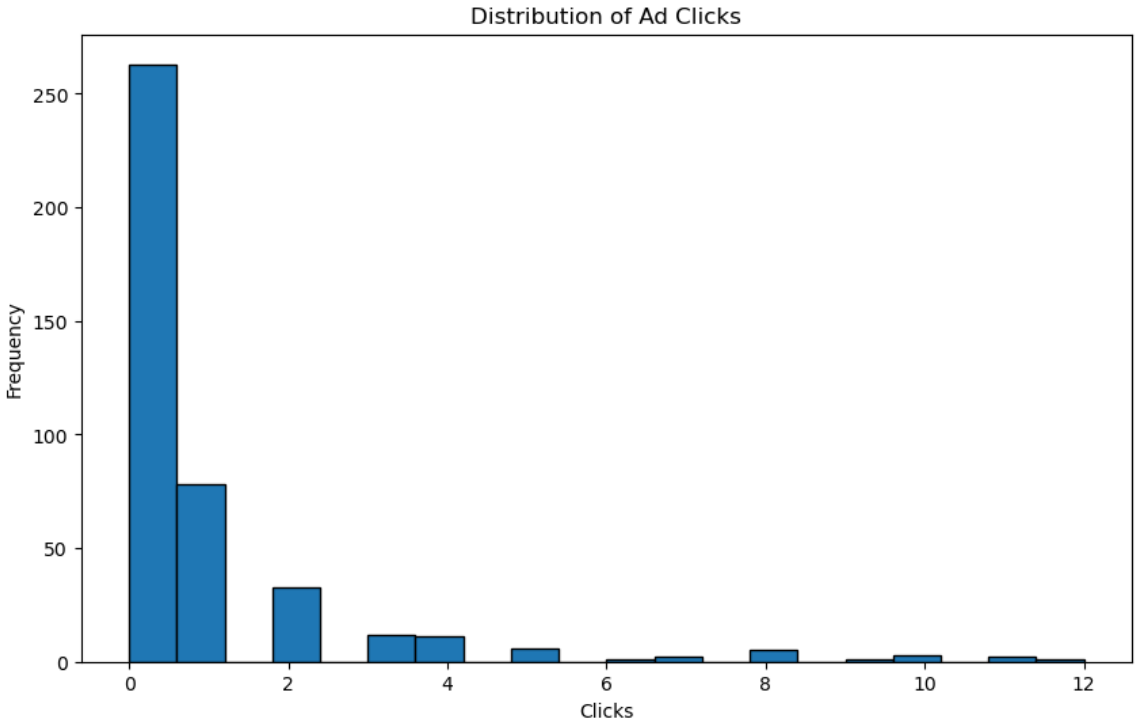
In [7]:

```
plt.figure(figsize=(10, 6))
plt.hist(data['Impressions'], bins=20, edgecolor='k')
plt.xlabel('Impressions')
plt.ylabel('Frequency')
plt.title('Distribution of Ad Impressions')
plt.show()
```



In [8]:

```
plt.figure(figsize=(10, 6))
plt.hist(data['Clicks'], bins=20, edgecolor='k')
plt.xlabel('Clicks')
plt.ylabel('Frequency')
plt.title('Distribution of Ad Clicks')
plt.show()
```

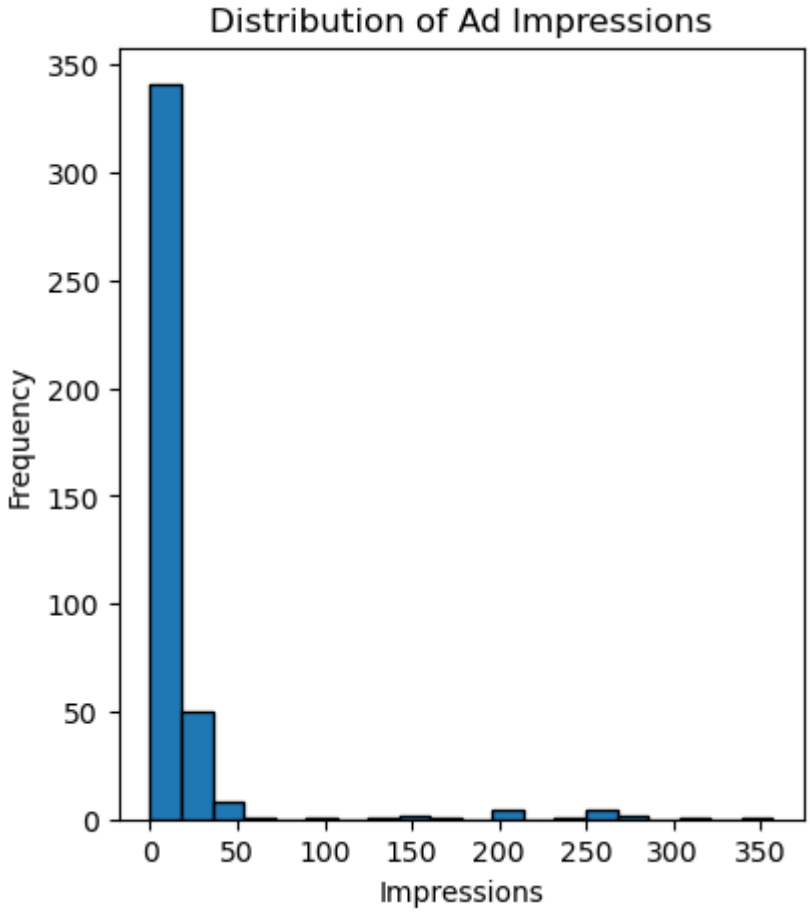


In [9]:

```
plt.figure(figsize=(15, 5))
plt.subplot(131)
plt.hist(data['Impressions'], bins=20, edgecolor='k')
plt.xlabel('Impressions')
plt.ylabel('Frequency')
plt.title('Distribution of Ad Impressions')
```

Out[9]:

```
Text(0.5, 1.0, 'Distribution of Ad Impressions')
```

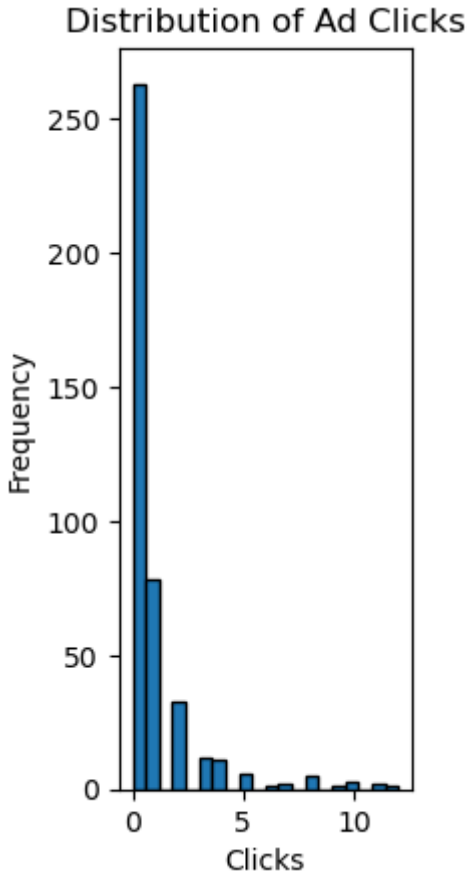


In [10]:

```
plt.subplot(132)
plt.hist(data['Clicks'], bins=20, edgecolor='k')
plt.xlabel('Clicks')
plt.ylabel('Frequency')
plt.title('Distribution of Ad Clicks')
```

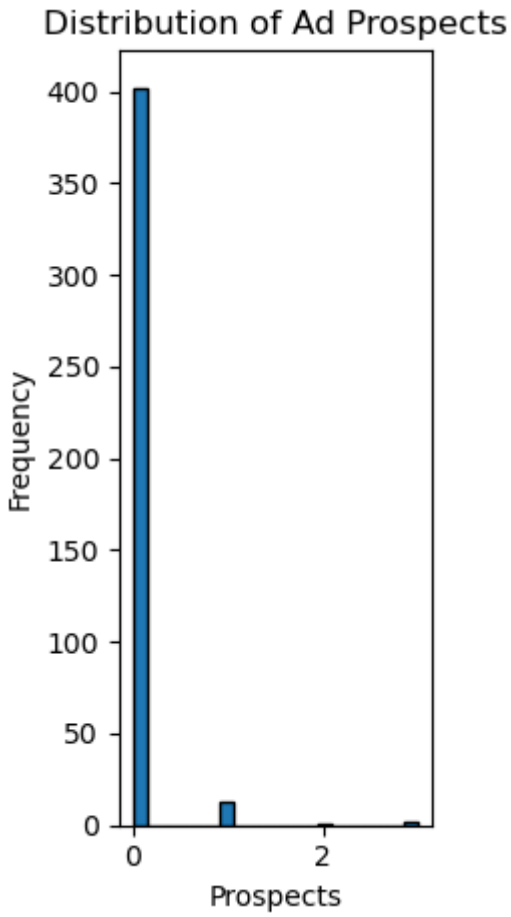
Out[10]:

```
Text(0.5, 1.0, 'Distribution of Ad Clicks')
```



In [11]:

```
plt.subplot(133)
plt.hist(data['Prospects'], bins=20, edgecolor='k')
plt.xlabel('Prospects')
plt.ylabel('Frequency')
plt.title('Distribution of Ad Prospects')

plt.tight_layout()
plt.show()
```



Step 4: Data Cleaning - Convert 'Payment ()′and′Cost()' columns to float, calculate 'Returns %'

In [12]:

```
data['Payment ($)'] = data['Payment ($)'].replace('[\$,]', '', regex=True).astype(float)
data['Cost ($)'] = data['Cost ($)'].replace('[\$,]', '', regex=True).astype(float)
```

In [13]:

```
data['Returns %'] = (data['Payment ($)'] / data['Cost ($)']) * 100
```

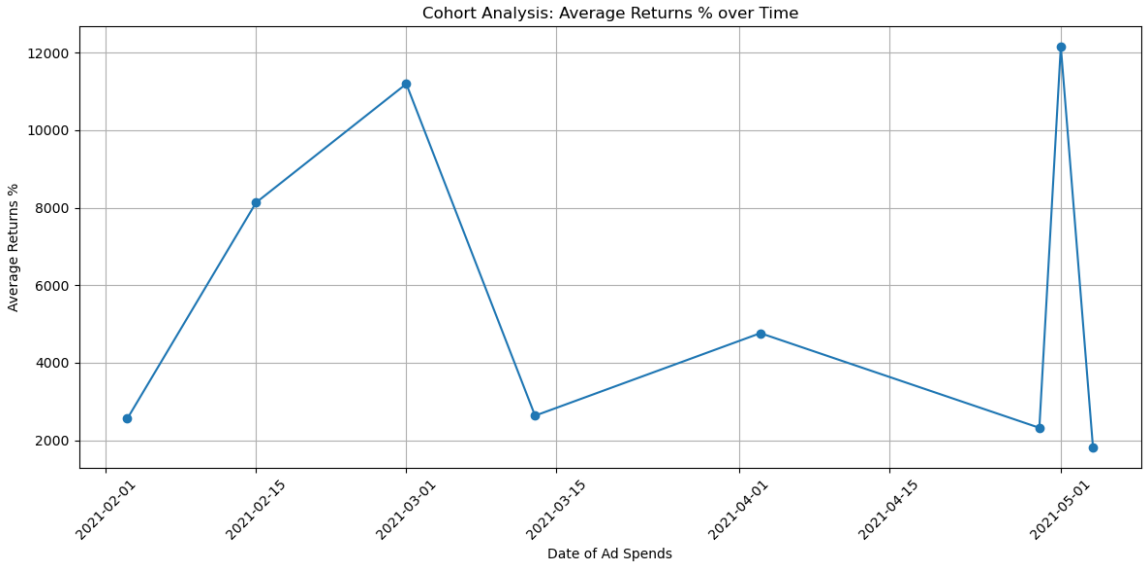
Step 5: Cohort Analysis - Average Returns % over time

In [14]:

```
cohort_analysis = data.groupby('Payment Date')['Returns %'].mean()
```

In [15]:

```
plt.figure(figsize=(12, 6))
plt.plot(cohort_analysis.index, cohort_analysis.values, marker='o', linestyle='-')
plt.xlabel('Date of Ad Spends')
plt.ylabel('Average Returns %')
plt.title('Cohort Analysis: Average Returns % over Time')
plt.xticks(rotation=45)
plt.grid(True)
plt.tight_layout()
plt.show()
```



Step 6: Key Metrics in Weekly and Monthly Format

In [16]:

```
data['Month'] = data['Payment Date'].dt.to_period('M')
```

In [17]:

```
weekly_report = data.groupby('Week').agg({'Cost ($)': 'sum', 'Returns %': 'mean'})
monthly_report = data.groupby('Month').agg({'Cost ($)': 'sum', 'Returns %': 'mean'})

print("Weekly Report:")
print(weekly_report)
```

```
Weekly Report:
            Cost ($)     Returns %
Week
2021-01-25    154.79   2594.569684
2021-02-01    192.58           NaN
2021-02-08    216.13   8132.780083
2021-02-15    235.30  11195.992486
2021-02-22    190.90           NaN
2021-03-01    141.40   2318.977757
2021-03-08    258.20           NaN
2021-03-15    184.36           NaN
2021-03-22    308.73   4761.714855
2021-03-29    172.11           NaN
2021-04-05    176.96           NaN
2021-04-12    137.21  12158.859470
2021-04-19     87.38           NaN
2021-04-26    103.26           NaN
2021-05-03    229.37   1809.320743
```

Step 7: Find the most profitable channel and category/keyword

In [18]:

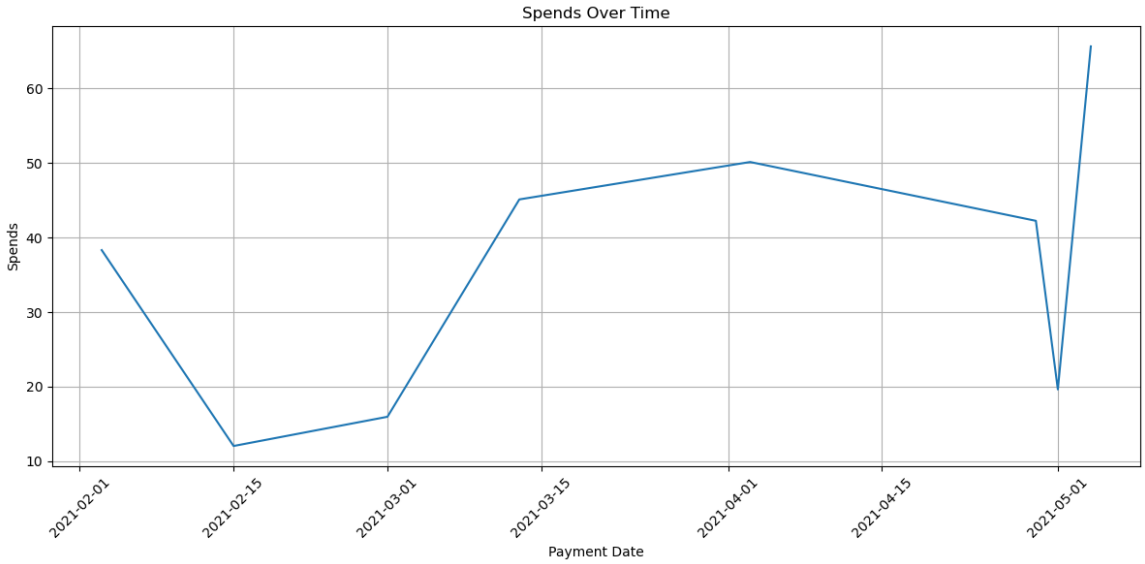
```
most_profitable_channel = data.groupby('Campaign')['Returns %'].mean().idxmax()

most_profitable_category = data.groupby('Search Keyword')['Returns %'].mean().idxmax()

# Display the most profitable channel and category/keyword
print("The most profitable channel is:", most_profitable_channel)
print("The most profitable category/keyword is:", most_profitable_category)
```

```
The most profitable channel is: EK_Generic_Tri-Tok_Reservation
The most profitable category/keyword is: reservation management system
```

Step 8: Time Series Graphs - Spends and Returns % over time

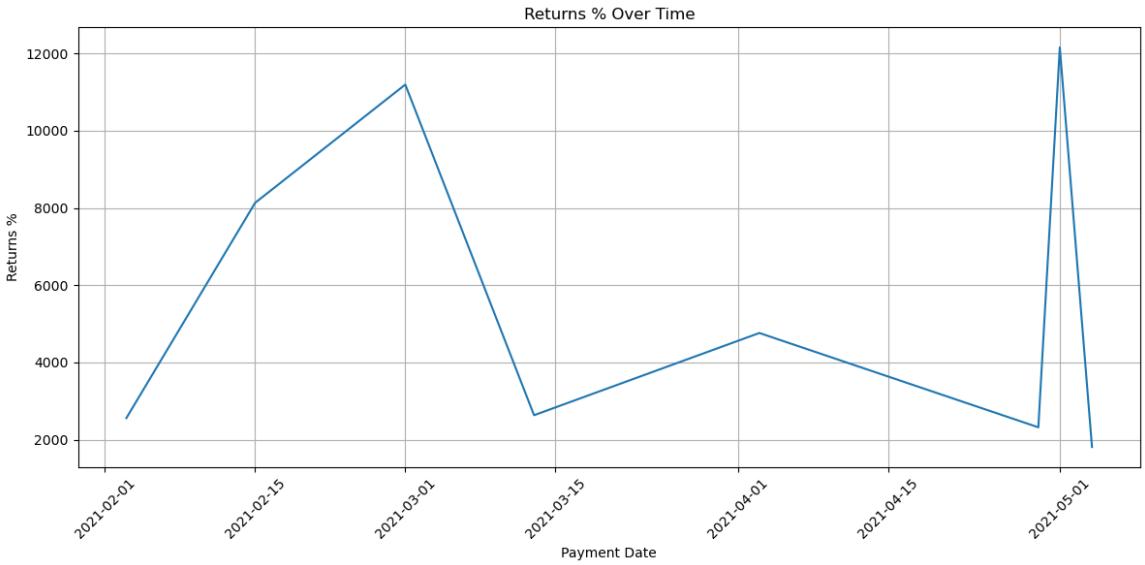
In [19]:

```
# Time series graph for 'Cost ($)' over time
plt.figure(figsize=(12, 6))
sns.lineplot(x='Payment Date', y='Cost ($)', data=data)
plt.xlabel('Payment Date')
plt.ylabel('Spends')
plt.title('Spends Over Time')
plt.xticks(rotation=45)
plt.grid(True)
plt.tight_layout()
plt.show()
```



In [20]:

```
# Time series graph for 'Returns %' over time
plt.figure(figsize=(12, 6))
sns.lineplot(x='Payment Date', y='Returns %', data=data)
plt.xlabel('Payment Date')
plt.ylabel('Returns %')
plt.title('Returns % Over Time')
plt.xticks(rotation=45)
plt.grid(True)
plt.tight_layout()
plt.show()
```



In [ ]: