Importing Libraries

In [20]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

STEP-1: Loading Dataset.

In [21]:
```
df = pd.read_csv(r"C:\Users\aryan\OneDrive\Desktop\DS PROJECTS\MINI PROJECT\BigBasket Products(1).csv")
df
```

Out[21]:

	index	product	category	sub_category	br
0	1	Garlic Oil - Vegetarian Capsule 500 mg	Beauty & Hygiene	Hair Care	Sri Sri Ayurvec
1	2	Water Bottle - Orange	Kitchen, Garden & Pets	Storage & Accessories	Masterc
2	3	Brass Angle Deep - Plain, No.2	Cleaning & Household	Pooja Needs	Trm
3	4	Cereal Flip Lid Container/Storage Jar - Assort...	Cleaning & Household	Bins & Bathroom Ware	Nakoda
4	5	Creme Soft Soap - For Hands & Body	Beauty & Hygiene	Bath & Hand Wash	Nivea
...	...	...	...	...	...
27550	27551	Wottagirl! Perfume Spray - Heaven, Classic	Beauty & Hygiene	Fragrances & Deos	Layerr
27551	27552	Rosemary	Gourmet & World Food	Cooking & Baking Needs	Purama

	index	product	category	sub_category	br
27552	27553	Peri-Peri Sweet Potato Chips	Gourmet & World Food	Snacks, Dry Fruits, Nuts	FabBox
27553	27554	Green Tea - Pure Original	Beverages	Tea	Tetley
27554	27555	United Dreams Go Far Deodorant	Beauty & Hygiene	Men's Grooming	United Colors C Benetto

27555 rows × 10 columns

Step 2: Use head function to look for first 12 rows.

In [22]:
```
df.head(12)
```

Out[22]:

	index	product	category	sub_category	brand
0	1	Garlic Oil - Vegetarian Capsule 500 mg	Beauty & Hygiene	Hair Care	Sri Sri Ayurveda
1	2	Water Bottle - Orange	Kitchen, Garden & Pets	Storage & Accessories	Mastercook
2	3	Brass Angle Deep - Plain, No.2	Cleaning & Household	Pooja Needs	Trm
3	4	Cereal Flip Lid Container/Storage Jar - Assort...	Cleaning & Household	Bins & Bathroom Ware	Nakoda
4	5	Creme Soft Soap - For Hands & Body	Beauty & Hygiene	Bath & Hand Wash	Nivea
5	6	Germ - Removal Multipurpose Wipes	Cleaning & Household	All Purpose Cleaners	Nature Protect
6	7	Multani Mati	Beauty & Hygiene	Skin Care	Satinance
7	8	Hand Sanitizer - 70% Alcohol Base	Beauty & Hygiene	Bath & Hand Wash	Bionova

	index	product	category	sub_category	brand
8	9	Biotin & Collagen Volumizing Hair Shampoo + Bi...	Beauty & Hygiene	Hair Care	StBotanica
9	10	Scrub Pad - Anti-Bacterial, Regular	Cleaning & Household	Mops, Brushes & Scrubs	Scotch brite
10	11	Wheat Grass Powder - Raw	Gourmet & World Food	Cooking & Baking Needs	NUTRASHIL
11	12	Butter Cookies Gold Collection	Gourmet & World Food	Chocolates & Biscuits	Sapphire

Step 3: Get Description of the data in the DataFrame

In [23]:
```
df.describe()
```

Out[23]:

	index	sale_price	market_price	rating
count	27555.00000	27549.000000	27555.000000	18919.000000
mean	13778.00000	334.648391	382.056664	3.943295
std	7954.58767	1202.102113	581.730717	0.739217
min	1.00000	2.450000	3.000000	1.000000
25%	6889.50000	95.000000	100.000000	3.700000
50%	13778.00000	190.320000	220.000000	4.100000
75%	20666.50000	359.000000	425.000000	4.300000
max	27555.00000	112475.000000	12500.000000	5.000000

Step 4: Find Information about the DataFrame.

In [27]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27555 entries, 0 to 27554
Data columns (total 10 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   index         27555 non-null  int64  
 1   product       27554 non-null  object 
 2   category      27555 non-null  object 
 3   sub_category  27555 non-null  object 
 4   brand         27554 non-null  object 
 5   sale_price    27549 non-null  float64
 6   market_price  27555 non-null  float64
 7   type          27555 non-null  object 
 8   rating        18919 non-null  float64
 9   description   27440 non-null  object 
dtypes: float64(3), int64(1), object(6)
memory usage: 2.1+ MB
```

Step 5: Find out Top & least sold products.

In [38]:
```
#Sort by rating to find Top & Least sold

top_sold = df.sort_values(by = 'rating', ascending = False).head(10)
least_sold = df.sort_values(by = 'rating', ascending =True).head(10)

# Display the results


print(" Top 10 Sold (Most Popular) Products:\n")
print(top_sold[['product', 'brand', 'category', 'rating',
'sale_price']])

print("\n Least 10 Sold (Least Popular) Products:\n")
print(least_sold[['product', 'brand', 'category', 'rating',
'sale_price']])
```

```
 Top 10 Sold (Most Popular) Products:

                                                product
brand  \
12416  Single Line Soft Bound Long Book Feminine Seri...
Navneet Youva
12413                                Squash - Kokum Kadi
NaturoBell
27502                                Forest Honey - Wild   Organic
Nation
20437  MaxFresh Blue Spicy Fresh Gel Toothpaste - Mum...
Colgate
5985                              Tea Tree Essential Oil    Kama
Ayurveda
27512           Water Bottle - Fridge, Tulip, Dark Blue
Cello
20315              Cleaner - Stainless Steel & Aluminum
Big D
20327                    Smooth Skin Oil - For Dry Skin  Aroma
Treasures
27508                       Palm Jaggery/Bella Crystals
Draft
27507                            Extra Crisp Sweet Corn
Daucy

                       category  rating  sale_price
12416      Cleaning & Household     5.0       53.00
12413                 Beverages     5.0      110.00
27502    Snacks & Branded Foods     5.0      350.00
20437          Beauty & Hygiene     5.0       89.25
5985           Beauty & Hygiene     5.0      750.00
27512    Kitchen, Garden & Pets     5.0      109.00
20315      Cleaning & Household     5.0      249.00
20327          Beauty & Hygiene     5.0      324.00
```

```
27508  Foodgrains, Oil & Masala     5.0      199.00
27507      Gourmet & World Food     5.0      202.50

 Least 10 Sold (Least Popular) Products:

                                                  product
brand  \
11219                                         Argan Oil
Aloe Veda
11175                               Vaginal Tightening Gel
Everteen
14265                     Ramona - Eau De Parfum, For Her
Maryaj
16863                                  Piping Gel, Neutral
Foodecor
4657                Black Gram Lentils Curry-Basmati Rice
Fazlani Foods
10557                                    Jasmine Potpourri
Soulflower
24261  Hibiscus & Red Melon Green Tea - 2 In 1 For Ho...
Care
15172                  Blue Incense Sticks - Economy Pack
Liberty
14251                                       Love & Joy EDP  All Good
Scents
1970                           OH! Pleasure Gel for Women
Skore

                     category  rating  sale_price
11219        Beauty & Hygiene     1.0      1755.0
11175        Beauty & Hygiene     1.0      1999.0
14265        Beauty & Hygiene     1.0       834.5
16863    Gourmet & World Food     1.0       104.5
4657   Snacks & Branded Foods     1.0       150.0
10557    Cleaning & Household     1.0       250.0
24261    Gourmet & World Food     1.0       250.0
15172    Cleaning & Household     1.0        54.0
14251        Beauty & Hygiene     1.0      1200.0
1970         Beauty & Hygiene     1.0       500.0
```

Step 6: Measuring discount on a certain item.

In [40]:
```
# Create a new column for discount percentage
df['discount_percent'] = ((df['market_price'] - df['sale_price']) /
df['market_price']) * 100

# Show a sample of the discount values
print(df[['product', 'market_price', 'sale_price',
'discount_percent']].head(10))
```

```
                                             product  market_price
\
0             Garlic Oil - Vegetarian Capsule 500 mg         220.0
1                               Water Bottle - Orange         180.0
2                     Brass Angle Deep - Plain, No.2         250.0
3  Cereal Flip Lid Container/Storage Jar - Assort...         176.0
4                 Creme Soft Soap - For Hands & Body         162.0
5                  Germ - Removal Multipurpose Wipes         199.0
6                                       Multani Mati          58.0
7                  Hand Sanitizer - 70% Alcohol Base         250.0
8  Biotin & Collagen Volumizing Hair Shampoo + Bi...        1098.0
9               Scrub Pad - Anti- Bacterial, Regular          20.0

   sale_price  discount_percent
0       220.0          0.000000
1       180.0          0.000000
2       119.0         52.400000
3       149.0         15.340909
4       162.0          0.000000
5       169.0         15.075377
6        58.0          0.000000
7       250.0          0.000000
8      1098.0          0.000000
9        20.0          0.000000
```

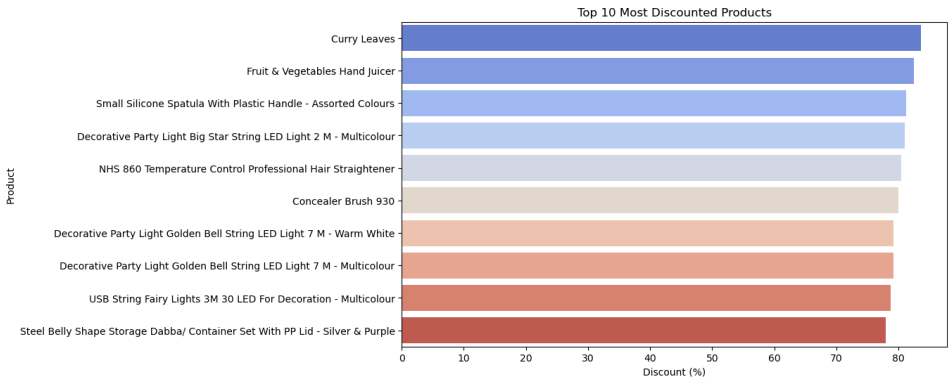
In [41]:
```
item = "Tata Salt"   # ← type any product name here

item_discount = df[df['product'].str.contains(item, case=False,
na=False)][
    ['product', 'market_price', 'sale_price', 'discount_percent']
]

print(item_discount)
```

```
Empty DataFrame
Columns: [product, market_price, sale_price, discount_percent]
Index: []
```

In [42]:
```
df['discount_percent'] = df['discount_percent'].round(2)
```

In [44]:
```
top_discount = df.sort_values(by='discount_percent',
ascending=False).head(10)

plt.figure(figsize=(10,6))
sns.barplot(x='discount_percent', y='product', data=top_discount,
palette='coolwarm')
plt.title('Top 10 Most Discounted Products')
plt.xlabel('Discount (%)')
plt.ylabel('Product')
plt.show()
```

```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\1491855841.py
:4: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `y` variable to `hue`
and set `legend=False` for the same effect.

  sns.barplot(x='discount_percent', y='product',
data=top_discount, palette='coolwarm')
```



Step 7: Find out the Missing Values from the Dataset.

In [45]:
```
df.isnull().sum()
```

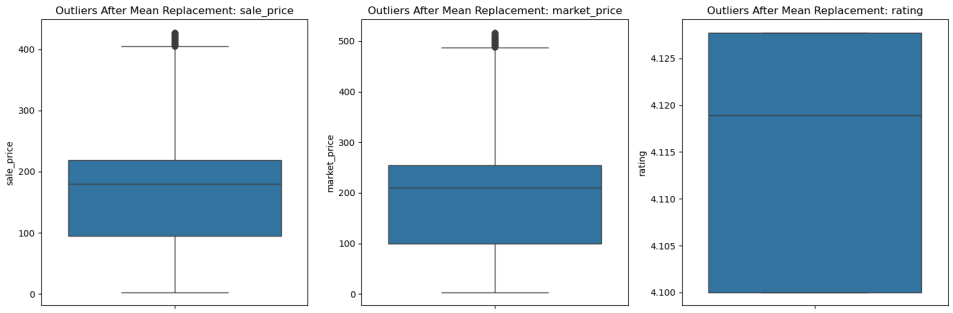
Out[45]:
```
index                0
product              1
category             0
sub_category         0
brand                1
sale_price           6
market_price         0
type                 0
rating            8636
description        115
discount_percent     6
dtype: int64
```

Step 8: Find out the outliers from the dataset according to the columns and fill them with the mean.

In [57]:
```
# Choose numeric columns to check
numeric_cols = ['sale_price', 'market_price', 'rating']

# Detect and replace outliers with mean
for col in numeric_cols:
    Q1 = df[col].quantile(0.25)
    Q3 = df[col].quantile(0.75)
    IQR = Q3 - Q1

    # Define bounds
    lower_limit = Q1 - 1.5 * IQR
    upper_limit = Q3 + 1.5 * IQR

    # Calculate mean of the column
    mean_value = df[col].mean()

    # Replace outliers with mean
    df.loc[(df[col] < lower_limit) | (df[col] > upper_limit), col] =
mean_value

print("Outliers have been replaced with mean successfully!")

# Step 4: Check updated data
print(df[numeric_cols].describe())
```

```
Outliers have been replaced with mean successfully!
         sale_price  market_price        rating
count  27549.000000  27555.000000  18919.000000
mean     172.957177    203.250192      4.113813
std       96.870779    118.958001      0.012436
min        2.450000      3.000000      4.100000
25%       95.000000    100.000000      4.100000
50%      180.000000    210.000000      4.118949
75%      219.000000    255.000000      4.127758
max      427.500000    517.000000      4.127758
```

In [58]:
```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(15,5))
for i, col in enumerate(numeric_cols, 1):
    plt.subplot(1, 3, i)
    sns.boxplot(y=df[col])
    plt.title(f"Outliers After Mean Replacement: {col}")

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

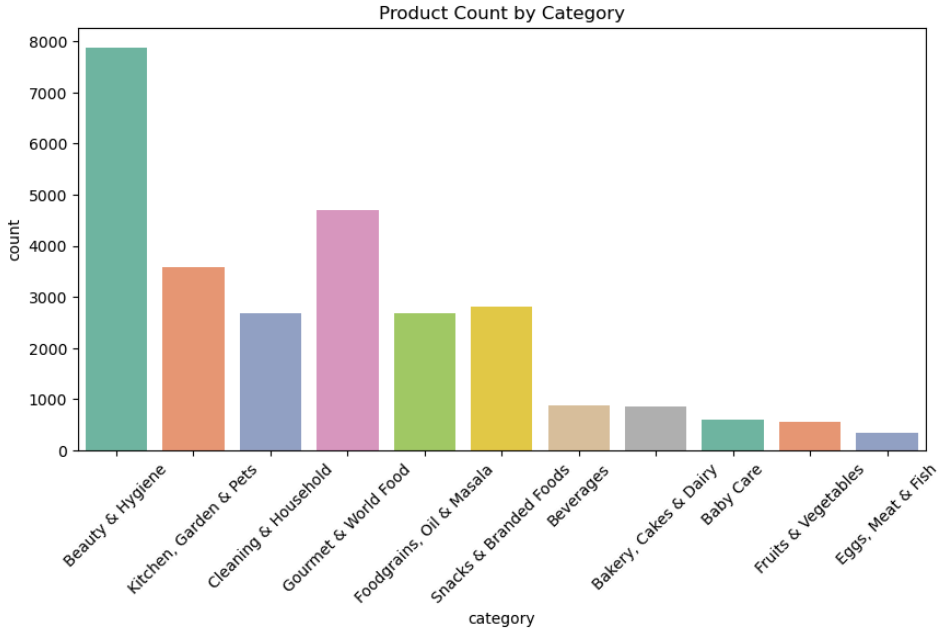


Step 9: Create Plots or visualizations.

Countplot – Category Distribution

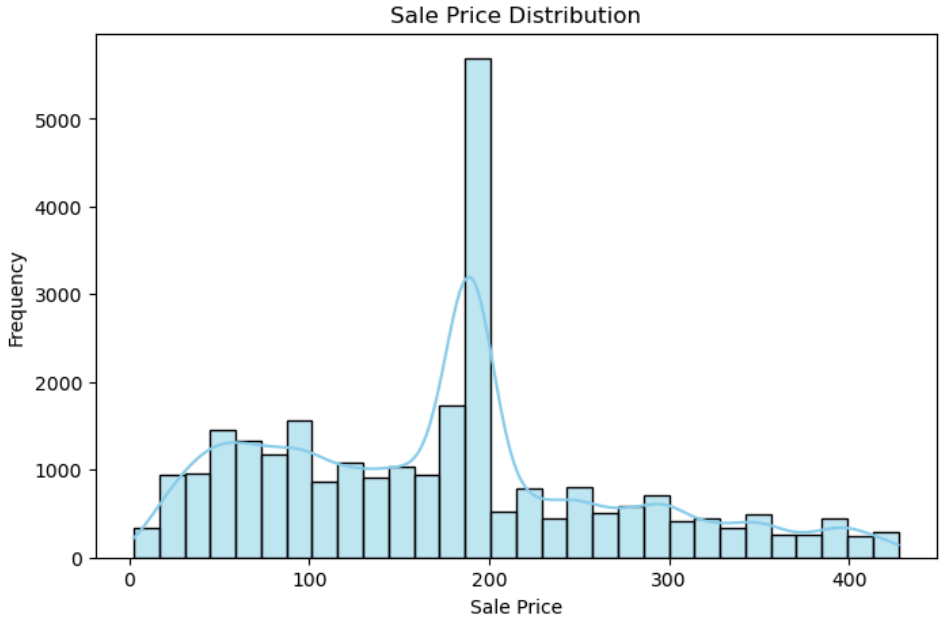
In [59]:
```
plt.figure(figsize=(10,5))
sns.countplot(x='category', data=df, palette='Set2')
plt.title('Product Count by Category')
plt.xticks(rotation=45)
plt.show()
```

```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\497824856.py:
2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `x` variable to `hue`
and set `legend=False` for the same effect.

  sns.countplot(x='category', data=df, palette='Set2')
```



Histogram – Price Distribution

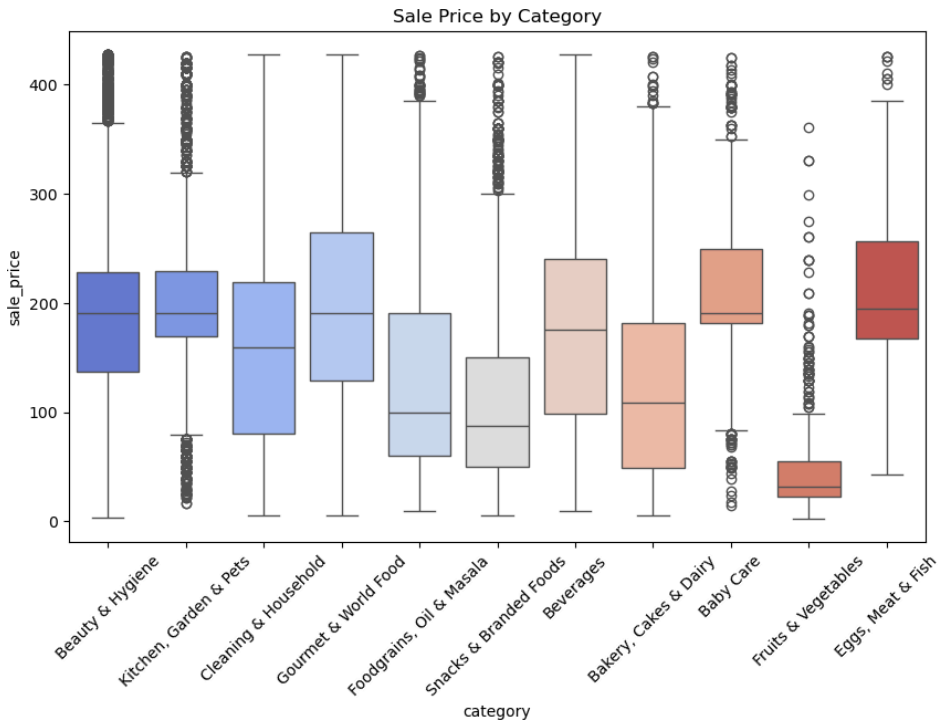
In [61]:
```
plt.figure(figsize=(8,5))
sns.histplot(df['sale_price'], bins=30, kde=True, color='skyblue')
plt.title('Sale Price Distribution')
plt.xlabel('Sale Price')
plt.ylabel('Frequency')
plt.show()
```



Boxplot – Category vs Sale Price

In [62]:
```
plt.figure(figsize=(10,6))
sns.boxplot(x='category', y='sale_price', data=df, palette='coolwarm')
plt.title('Sale Price by Category')
plt.xticks(rotation=45)
plt.show()
```

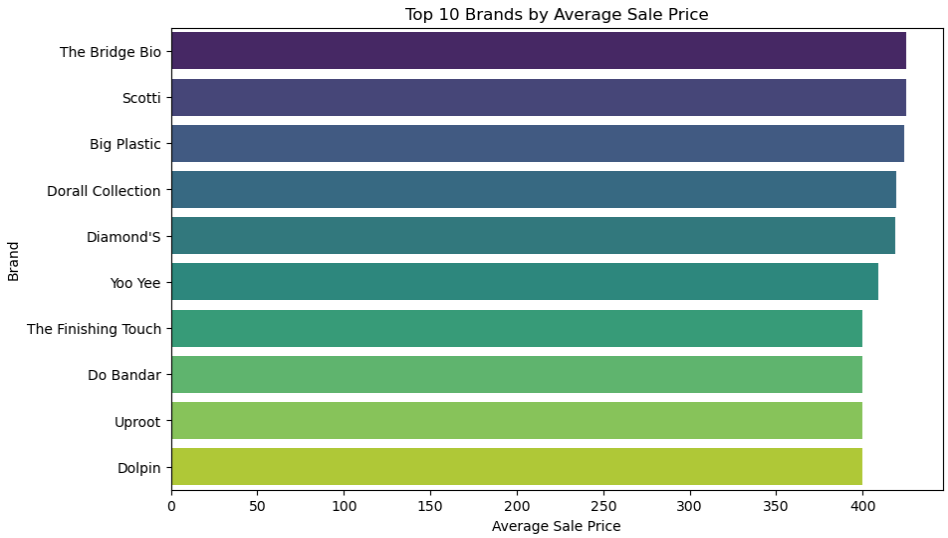
```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\1584097190.py
:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `x` variable to `hue`
and set `legend=False` for the same effect.

  sns.boxplot(x='category', y='sale_price', data=df,
palette='coolwarm')
```



Barplot – Average Price by Brand

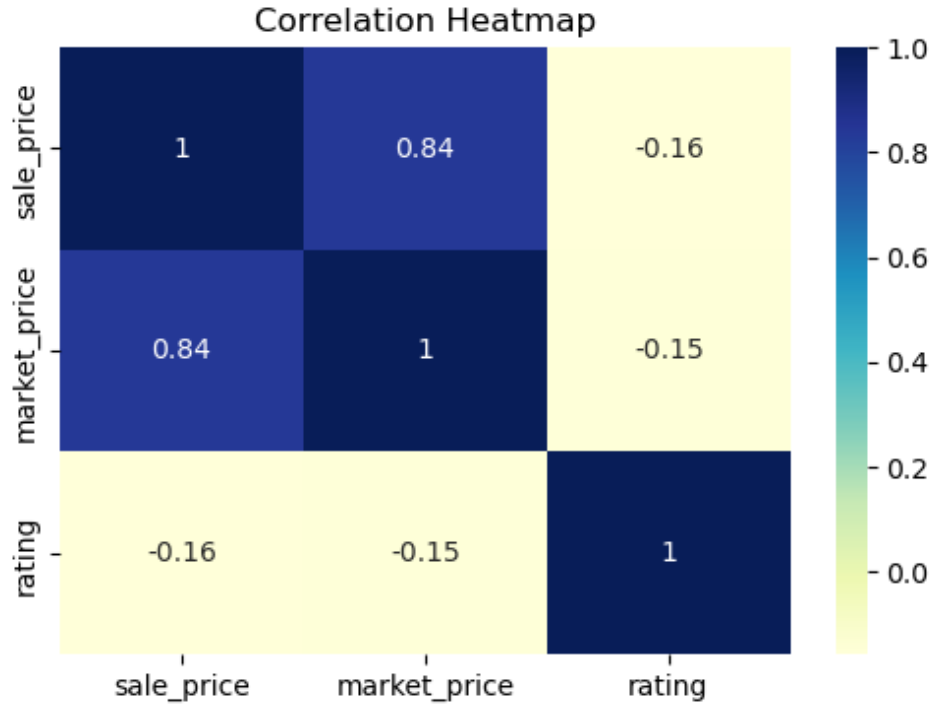
In [63]:
```
plt.figure(figsize=(10,6))
avg_price = df.groupby('brand')
['sale_price'].mean().sort_values(ascending=False).head(10)
sns.barplot(x=avg_price.values, y=avg_price.index, palette='viridis')
plt.title('Top 10 Brands by Average Sale Price')
plt.xlabel('Average Sale Price')
plt.ylabel('Brand')
plt.show()
```

```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\2920604037.py
:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `y` variable to `hue`
and set `legend=False` for the same effect.

  sns.barplot(x=avg_price.values, y=avg_price.index,
palette='viridis')
```



Heatmap – Correlation Between Numeric Columns

In [64]:
```
plt.figure(figsize=(6,4))
sns.heatmap(df[['sale_price', 'market_price', 'rating']].corr(),
annot=True, cmap='YlGnBu')
plt.title('Correlation Heatmap')
plt.show()
```



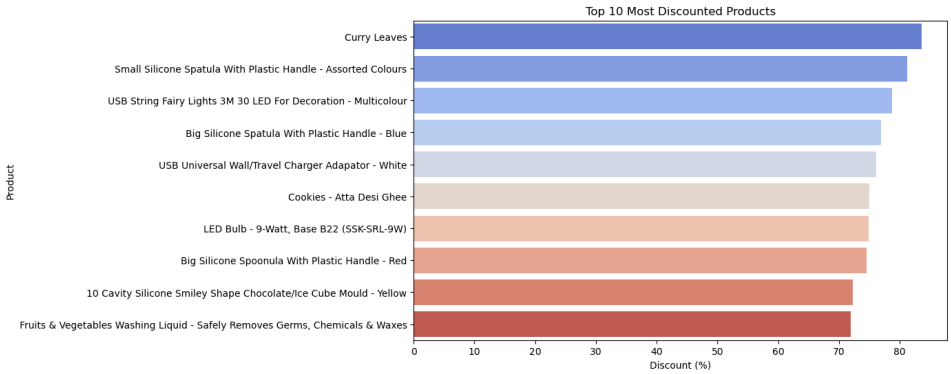
Scatter Plot – Sale Price vs Rating

In [65]:
```
plt.figure(figsize=(8,5))
sns.scatterplot(x='sale_price', y='rating', data=df, color='purple')
plt.title('Sale Price vs Rating')
plt.show()
```

Discount Plot – Top 10 Most Discounted Products

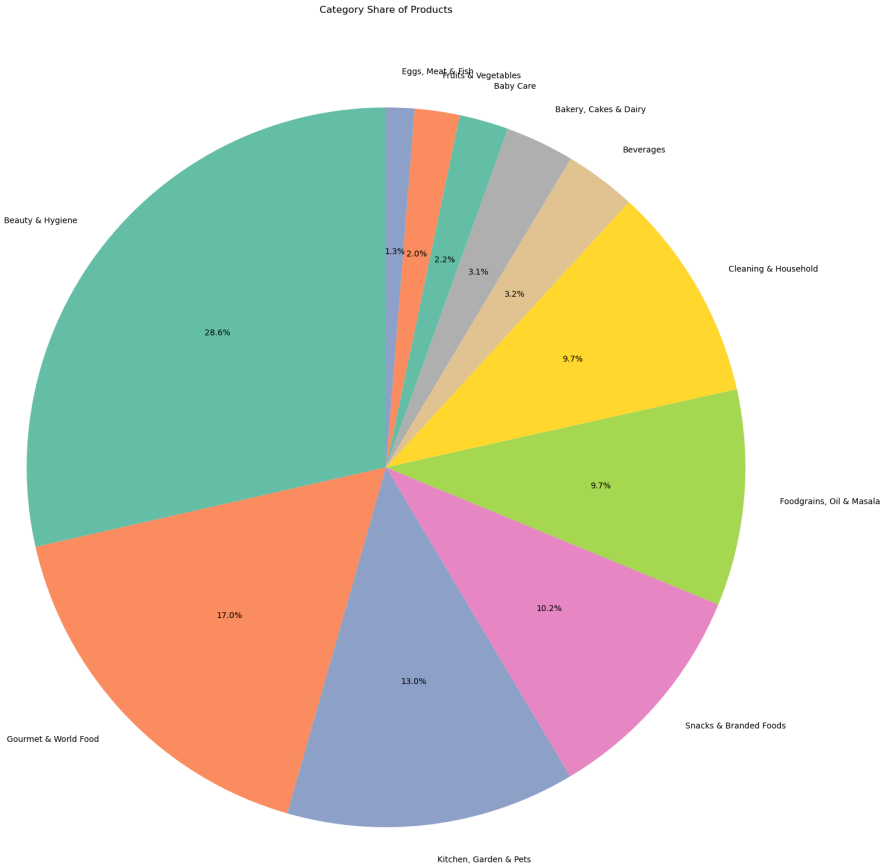
In [66]:
```
df['discount_percent'] = ((df['market_price'] - df['sale_price']) /
df['market_price']) * 100
top_discount = df.sort_values(by='discount_percent',
ascending=False).head(10)

plt.figure(figsize=(10,6))
sns.barplot(x='discount_percent', y='product', data=top_discount,
palette='coolwarm')
plt.title('Top 10 Most Discounted Products')
plt.xlabel('Discount (%)')
plt.ylabel('Product')
plt.show()
```

```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\3573293495.py
:5: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `y` variable to `hue`
and set `legend=False` for the same effect.

  sns.barplot(x='discount_percent', y='product',
data=top_discount, palette='coolwarm')
```



Pie Chart – Share of Categories

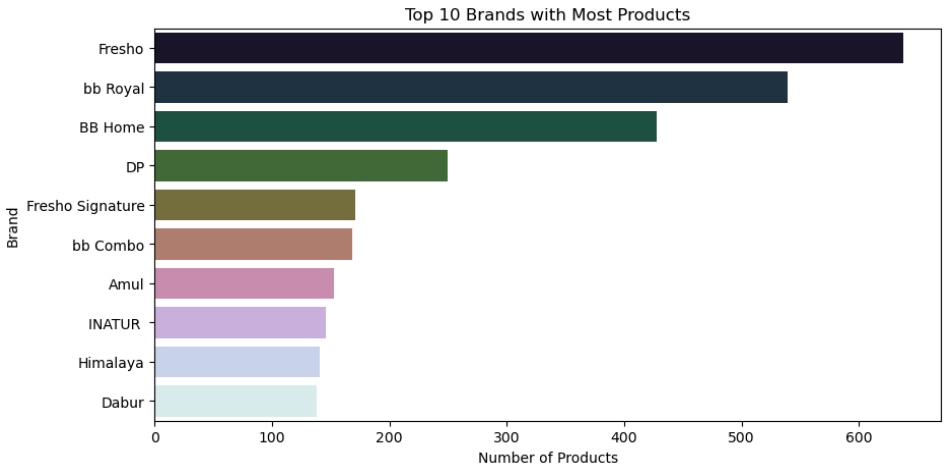
In [71]:
```
category_counts = df['category'].value_counts()
plt.figure(figsize=(20,20))
plt.pie(category_counts, labels=category_counts.index,
autopct='%1.1f%%', startangle=90, colors=sns.color_palette('Set2'))
plt.title('Category Share of Products')
plt.show()
```



Countplot – Top 10 Brands by Number of Products

In [72]:
```
top_brands = df['brand'].value_counts().head(10)
plt.figure(figsize=(10,5))
sns.barplot(x=top_brands.values, y=top_brands.index,
palette='cubehelix')
plt.title('Top 10 Brands with Most Products')
plt.xlabel('Number of Products')
plt.ylabel('Brand')
plt.show()
```

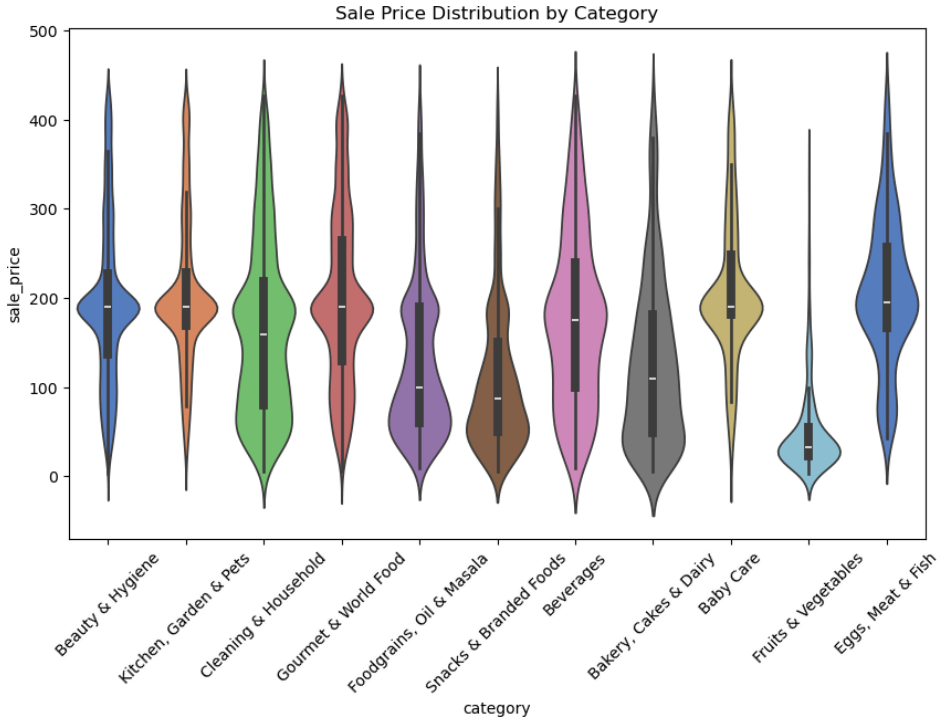
```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\4112046618.py
:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `y` variable to `hue`
and set `legend=False` for the same effect.

  sns.barplot(x=top_brands.values, y=top_brands.index,
palette='cubehelix')
```



Violin Plot – Price Distribution by Category

In [73]:
```
plt.figure(figsize=(10,6))
sns.violinplot(x='category', y='sale_price', data=df, palette='muted')
plt.title('Sale Price Distribution by Category')
plt.xticks(rotation=45)
plt.show()
```

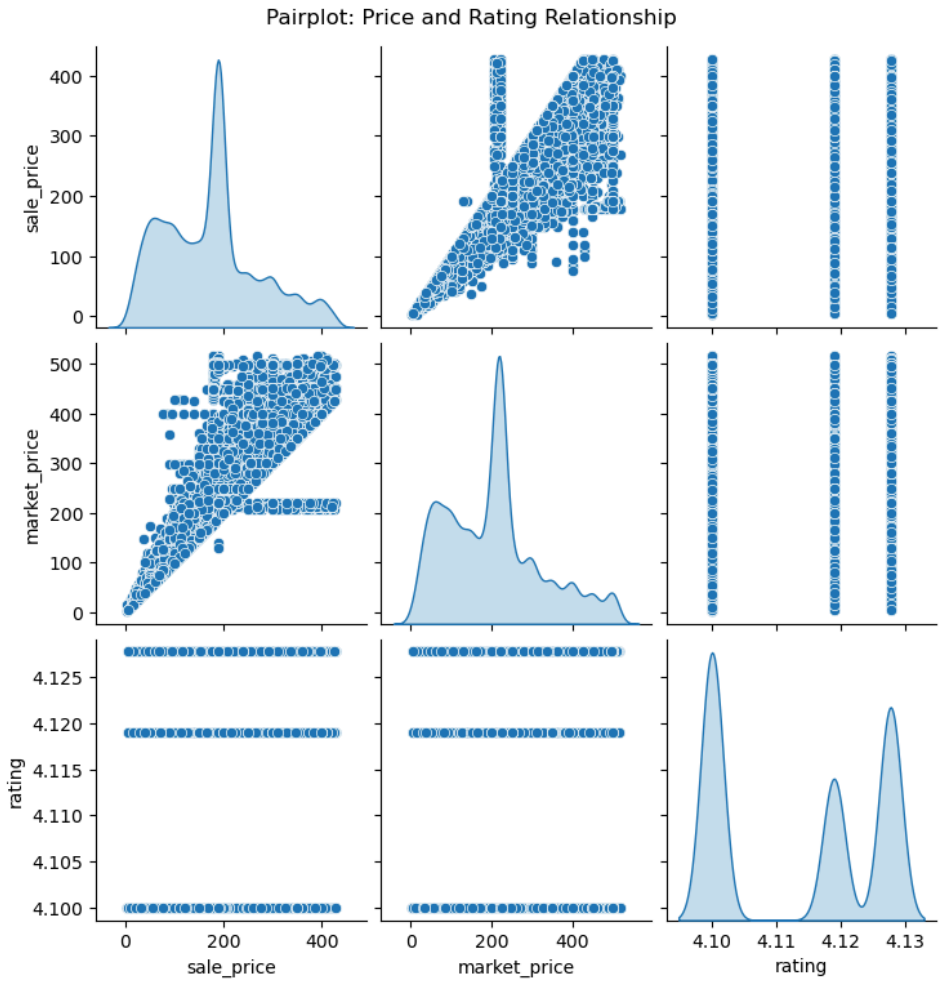
```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\3527681912.py
:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `x` variable to `hue`
and set `legend=False` for the same effect.

  sns.violinplot(x='category', y='sale_price', data=df,
palette='muted')
```



Discount vs Rating (Scatter Plot)

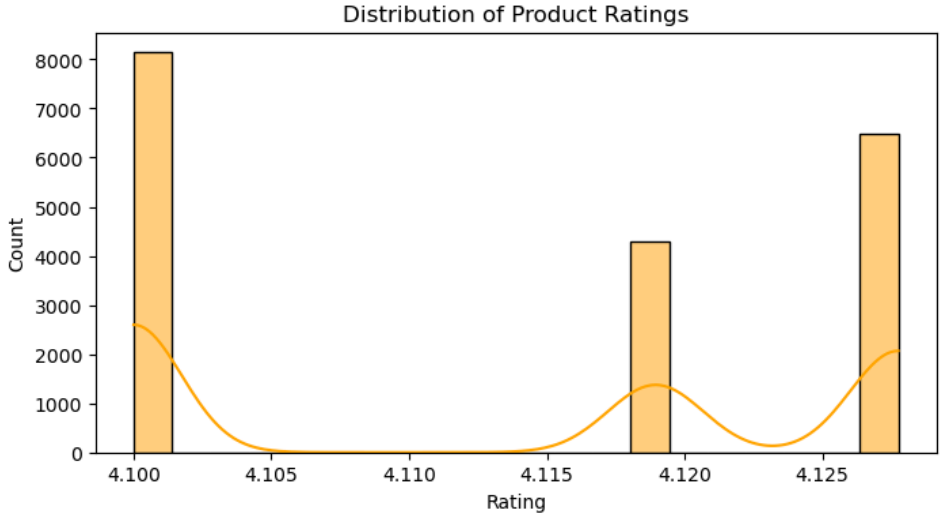
In [74]:
```
sns.pairplot(df[['sale_price', 'market_price', 'rating']],
diag_kind='kde', palette='coolwarm')
plt.suptitle('Pairplot: Price and Rating Relationship', y=1.02)
plt.show()
```

```
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1513: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=vector, **plot_kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1513: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=vector, **plot_kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1513: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=vector, **plot_kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1615: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=x, y=y, **kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1615: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=x, y=y, **kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1615: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=x, y=y, **kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1615: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=x, y=y, **kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1615: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=x, y=y, **kwargs)
C:\Users\aryan\anaconda3\Lib\site-
packages\seaborn\axisgrid.py:1615: UserWarning: Ignoring
`palette` because no `hue` variable has been assigned.
  func(x=x, y=y, **kwargs)
```



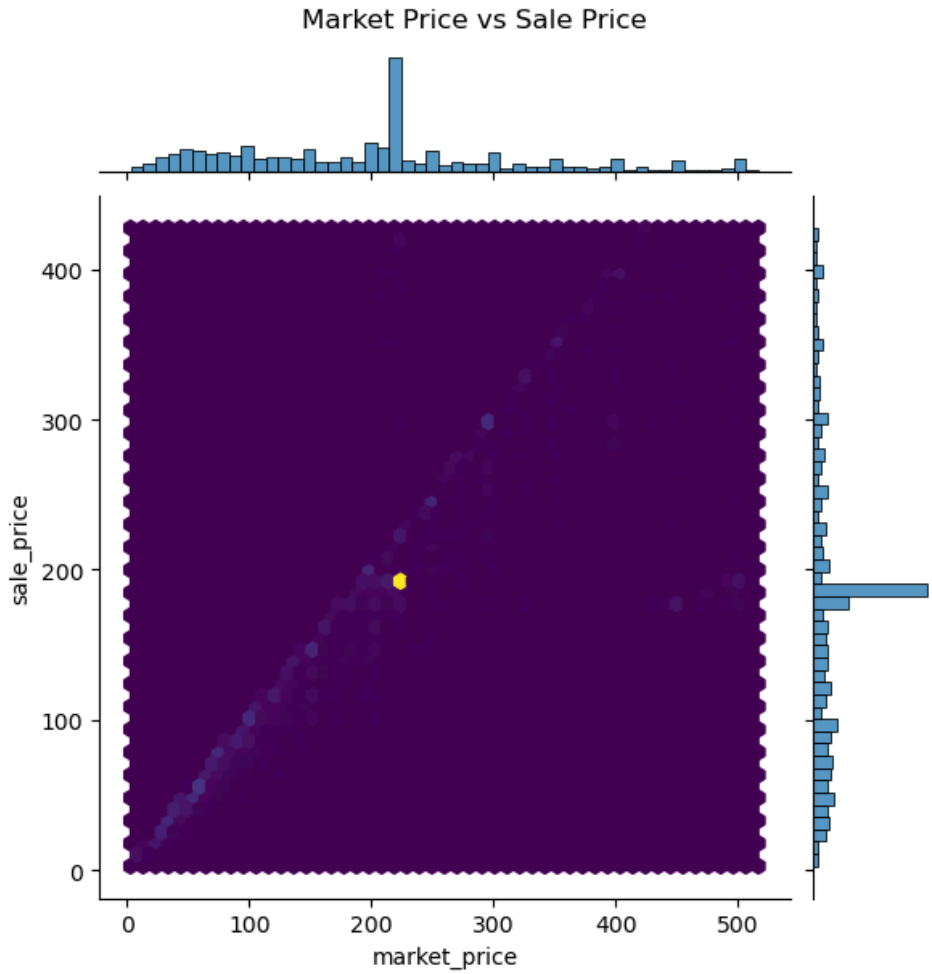
Distribution Plot – Ratings

In [75]:
```
plt.figure(figsize=(8,4))
sns.histplot(df['rating'], bins=20, kde=True, color='orange')
plt.title('Distribution of Product Ratings')
plt.xlabel('Rating')
plt.ylabel('Count')
plt.show()
```



Joint Plot – Sale Price vs Market Price

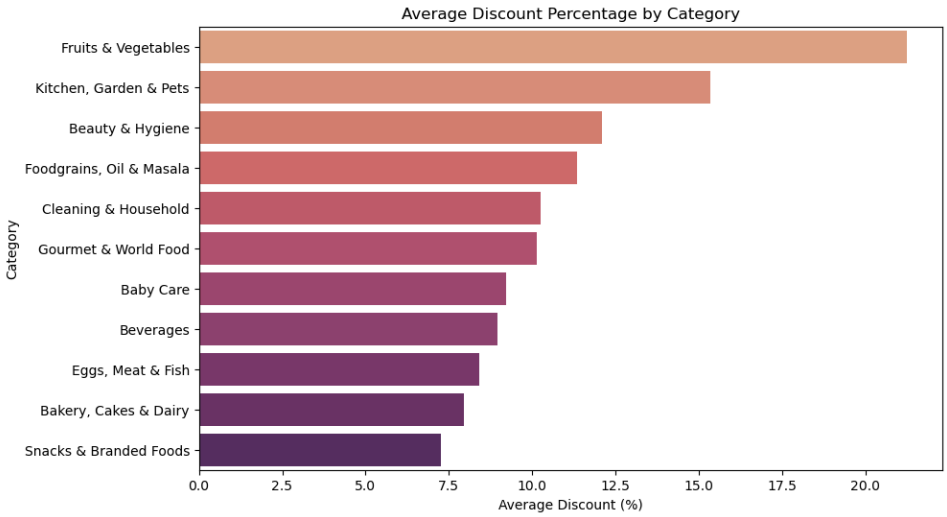
In [76]:
```
sns.jointplot(x='market_price', y='sale_price', data=df, kind='hex',
cmap='viridis')
plt.suptitle('Market Price vs Sale Price', y=1.02)
plt.show()
```



Barplot – Average Discount by Category

In [77]:
```
df['discount_percent'] = ((df['market_price'] - df['sale_price']) /
df['market_price']) * 100
plt.figure(figsize=(10,6))
avg_discount = df.groupby('category')
['discount_percent'].mean().sort_values(ascending=False)
sns.barplot(x=avg_discount.values, y=avg_discount.index,
palette='flare')
plt.title('Average Discount Percentage by Category')
plt.xlabel('Average Discount (%)')
plt.ylabel('Category')
plt.show()
```

```
C:\Users\aryan\AppData\Local\Temp\ipykernel_14412\2190907661.py
:4: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and
will be removed in v0.14.0. Assign the `y` variable to `hue`
and set `legend=False` for the same effect.

  sns.barplot(x=avg_discount.values, y=avg_discount.index,
palette='flare')
```



Conclusion

- Category Distribution: Certain categories such as Foodgrains, Oils & Masala and Beverages dominate the product range, showing Big Basket's focus on daily essentials.

- Price Insights: Most products are priced under ₹500, with only a few premium items above ₹1000, indicating Big Basket's wide appeal to middle-income households.

- Brand Analysis: A few brands contribute a large portion of products and sales, highlighting brand loyalty and strong supplier relationships.

- Discount Trends: The discount percentage varies widely across categories — packaged food and household essentials often have the highest discounts to attract repeat buyers.

- Ratings: Most products have ratings between 3.5 and 5, indicating generally positive customer feedback and trust in Big Basket's product quality.

- Outliers: A small number of products had unusually high or low prices; these were identified and treated (replaced with mean values) to improve data accuracy.

The Exploratory Data Analysis of the Big Basket dataset revealed key insights into pricing, brand performance, and customer preferences. Most products are moderately priced, with essentials like groceries and beverages dominating the inventory. Discounts are highest in everyday-use categories, helping attract frequent buyers. Ratings indicate that customers are generally satisfied, with most products rated above 3.5. A strong correlation between market and sale prices confirms consistent pricing strategies, while outlier treatment and visualizations improved data quality and understanding. Overall, the analysis highlights Big Basket's effective product management and competitive pricing approach.

In [ ]:

In [ ]: