assignment 16 pizza sales exercise

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PIZZA RESTAURANT SALES

This pizza sales dataset make up 12 relevant features:

1- Order_id: Unique identifier for each order placed by a table

2- Order_details_id: Unique identifier for each pizza placed within each order (pizzas of the same type and size are kept in the same row, and the quantity increases)

3- Pizza_id: Unique key identifier that ties the pizza ordered to its details, like size and price

4- Quantity: Quantity ordered for each pizza of the same type and size

5- Order_date: Date the order was placed (entered into the system prior to cooking & serving)

6- Order_time: Time the order was placed (entered into the system prior to cooking & serving)

7- Unit_price: Price of the pizza in USD

8- Total_price: unit_price * quantity

9- Pizza_size: Size of the pizza (Small, Medium, Large, X Large, or XX Large)

10- Pizza_type: Unique key identifier that ties the pizza ordered to its details, like size and price

11- Pizza_ingredients: ingredients used in the pizza as shown in the menu (they all include Mozzarella Cheese, even if not specified; and they all include Tomato Sauce, unless another sauce is specified)

12- Pizza_name: Name of the pizza as shown in the menu

Here are some questions that we'd like to be able to answer:

1. What days and times do we tend to be busiest?
2. How many pizzas are we making during peak periods?
3. What are our best and worst-selling pizzas?
4. What's our average order value?
5. How well are we utilizing our seating capacity? (we have 15 tables and 60 seats)

Importing Libraries

In [3]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import datetime
import plotly.express as px
```

Loading Dataset

In [4]:
```
pizza=pd.read_csv('pizza_sales.csv')
pizza.head()
```

Out[4]:

	order_details_id	order_id	pizza_id	quantity	order_date	order_time	unit_price	total_pric
0	1	1	hawaiian_m	1	1/1/2015	11:38:36	13.25	13.2
1	2	2	classic_dlx_m	1	1/1/2015	11:57:40	16.00	16.0
2	3	2	five_cheese_l	1	1/1/2015	11:57:40	18.50	18.5
3	4	2	ital_supr_l	1	1/1/2015	11:57:40	20.75	20.7
4	5	2	mexicana_m	1	1/1/2015	11:57:40	16.00	16.0

Exploratory Some Information About Dataset

In [5]:
```
pizza.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 48620 entries, 0 to 48619
Data columns (total 12 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   order_details_id   48620 non-null  int64  
 1   order_id           48620 non-null  int64  
 2   pizza_id           48620 non-null  object 
 3   quantity           48620 non-null  int64  
 4   order_date         48620 non-null  object 
 5   order_time         48620 non-null  object 
 6   unit_price         48620 non-null  float64
 7   total_price        48620 non-null  float64
 8   pizza_size         48620 non-null  object 
 9   pizza_category     48620 non-null  object 
 10  pizza_ingredients  48620 non-null  object 
 11  pizza_name         48620 non-null  object 
dtypes: float64(2), int64(3), object(7)
memory usage: 4.5+ MB
```

In [6]:
```
pizza.describe()
```

Out[6]:

	order_details_id	order_id	quantity	unit_price	total_price
count	48620.000000	48620.000000	48620.000000	48620.000000	48620.000000
mean	24310.500000	10701.479761	1.019622	16.494132	16.821474
std	14035.529381	6180.119770	0.143077	3.621789	4.437398
min	1.000000	1.000000	1.000000	9.750000	9.750000
25%	12155.750000	5337.000000	1.000000	12.750000	12.750000
50%	24310.500000	10682.500000	1.000000	16.500000	16.500000
75%	36465.250000	16100.000000	1.000000	20.250000	20.500000
max	48620.000000	21350.000000	4.000000	35.950000	83.000000

In [7]:
```
pizza.shape
```

Out[7]:
```
(48620, 12)
```

In [8]:

```
pizza.isnull().sum()
```

Out[8]:

```
order_details_id     0
order_id             0
pizza_id             0
quantity             0
order_date           0
order_time           0
unit_price           0
total_price          0
pizza_size           0
pizza_category       0
pizza_ingredients    0
pizza_name           0
dtype: int64
```

In [9]:

```
pizza.columns
```

Out[9]:

```
Index(['order_details_id', 'order_id', 'pizza_id', 'quantity', 'order_date',
       'order_time', 'unit_price', 'total_price', 'pizza_size',
       'pizza_category', 'pizza_ingredients', 'pizza_name'],
      dtype='object')
```

Change the hour object into integer

In [10]:

```
pizza["order_time"] = pizza["order_time"].astype("string")
pizza[["hour","minute","second"]] = pizza["order_time"].str.split(":",expand=T
pizza["hour"].value_counts()
```

Out[10]:

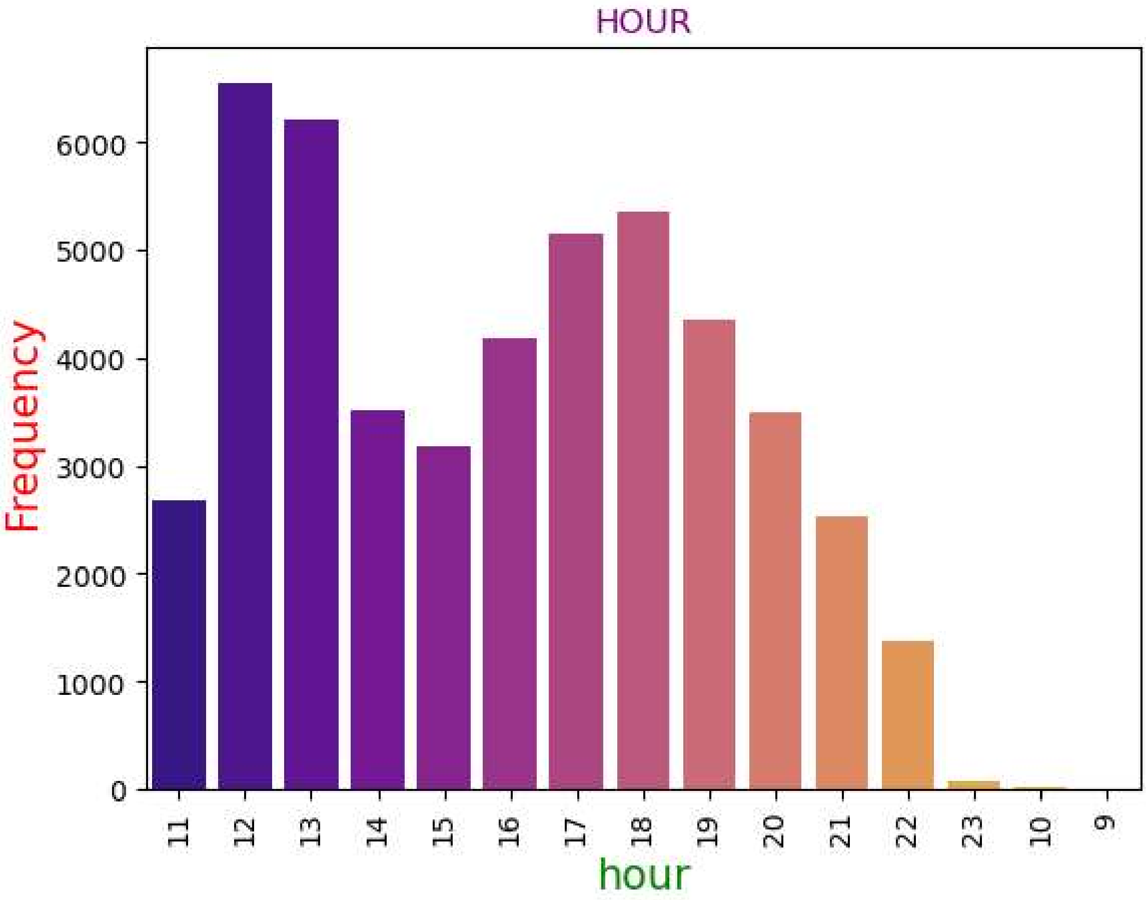
```
12    6543
13    6203
18    5359
17    5143
19    4350
16    4185
14    3521
20    3487
15    3170
11    2672
21    2528
22    1370
23      68
10      17
9        4
Name: hour, dtype: Int64
```

Data Visualization

Q1. Plot the graph between hour and sales

In [11]:

```
sns.countplot(data=pizza,x="hour",palette="plasma")
plt.xticks(rotation=90)
plt.xlabel("hour",fontsize=15,color="green")
plt.ylabel("Frequency",fontsize=15,color="red")
plt.title("HOUR",color="purple")
plt.show()
```



Q2. Find the total order in a year

In [12]:

```
pizza['order_year'] =pd.DatetimeIndex( pizza['order_date']).year
pizza['order_year'].value_counts()
```

```
or specify infer_datetime_format=True for consistent parsing.
  dtarr = DatetimeArray._from_sequence_not_strict(
C:\Users\user\anaconda3\lib\site-packages\pandas\core\indexes\datetimes.py:
327: UserWarning: Parsing '14/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  dtarr = DatetimeArray._from_sequence_not_strict(
C:\Users\user\anaconda3\lib\site-packages\pandas\core\indexes\datetimes.py:
327: UserWarning: Parsing '15/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  dtarr = DatetimeArray._from_sequence_not_strict(
C:\Users\user\anaconda3\lib\site-packages\pandas\core\indexes\datetimes.py:
327: UserWarning: Parsing '16/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  dtarr = DatetimeArray._from_sequence_not_strict(
C:\Users\user\anaconda3\lib\site-packages\pandas\core\indexes\datetimes.py:
327: UserWarning: Parsing '17/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  dtarr = DatetimeArray._from_sequence_not_strict(
C:\Users\user\anaconda3\lib\site-packages\pandas\core\indexes\datetimes.py:
327: UserWarning: Parsing '18/12/2015' in DD/MM/YYYY format. Provide format
```

Q3. Find The day-wise sales

In [13]:

```
pizza['order_date'] = pd.to_datetime(pizza['order_date'])
pizza['order_date']
```

```
C:\Users\user\anaconda3\lib\site-packages\pandas\core\tools\datetimes.py:10
47: UserWarning: Parsing '16/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
C:\Users\user\anaconda3\lib\site-packages\pandas\core\tools\datetimes.py:10
47: UserWarning: Parsing '17/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
C:\Users\user\anaconda3\lib\site-packages\pandas\core\tools\datetimes.py:10
47: UserWarning: Parsing '18/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
C:\Users\user\anaconda3\lib\site-packages\pandas\core\tools\datetimes.py:10
47: UserWarning: Parsing '19/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
C:\Users\user\anaconda3\lib\site-packages\pandas\core\tools\datetimes.py:10
47: UserWarning: Parsing '20/12/2015' in DD/MM/YYYY format. Provide format
or specify infer_datetime_format=True for consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
```

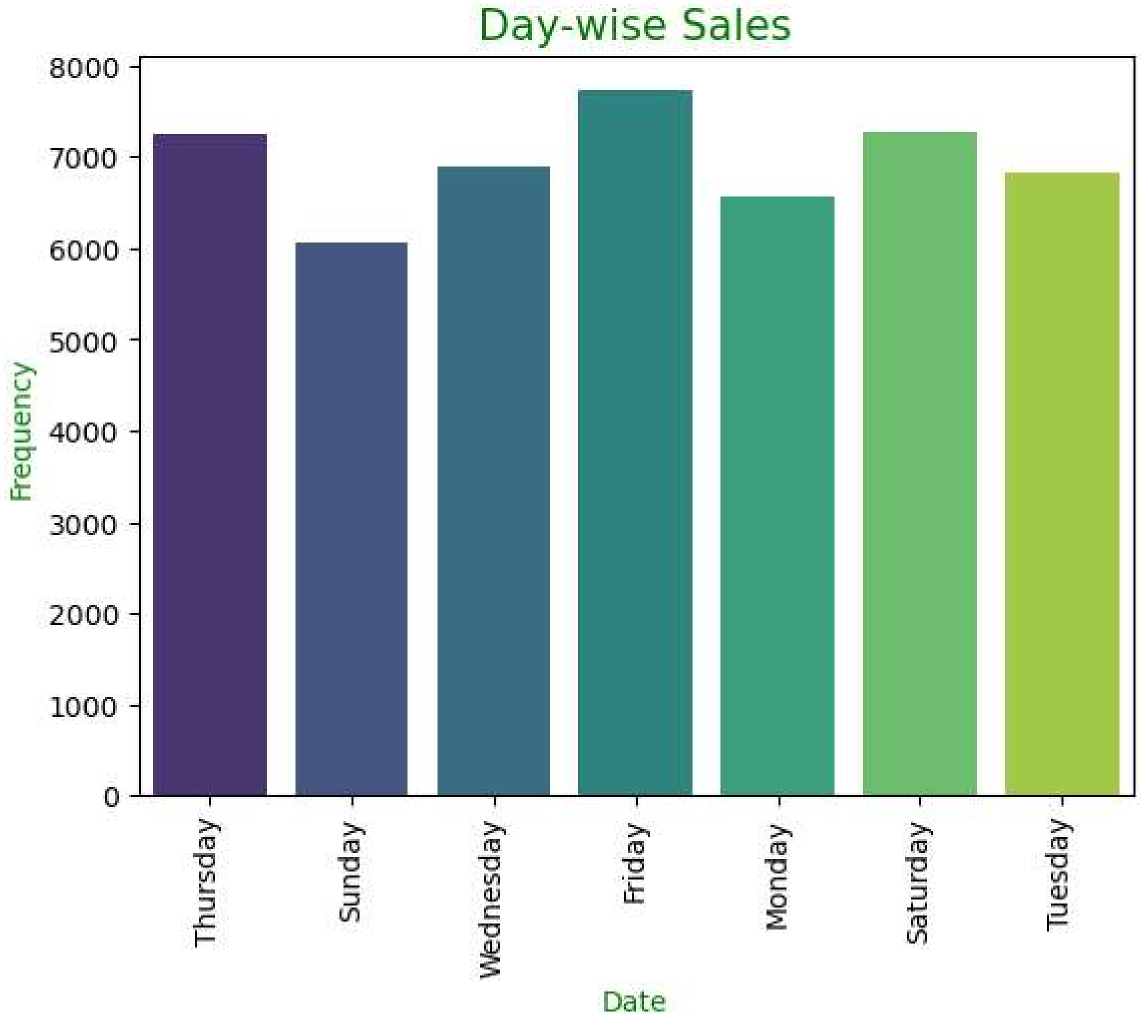
In [14]:
```
pizza['order_dates'] = pizza['order_date'].dt.day_name()
pizza['order_dates'].value_counts()
```

Out[14]:
```
Friday       7723
Saturday     7274
Thursday     7243
Wednesday    6907
Tuesday      6833
Monday       6577
Sunday       6063
Name: order_dates, dtype: int64
```

Plot the graph for day-wise sales

In [15]:
```
palette="viridis"
```

In [16]:
```
sns.countplot(data=pizza,x="order_dates",palette="viridis")
plt.xticks(rotation=90)
plt.xlabel("Date",fontsize=10,color="green")
plt.ylabel("Frequency",fontsize=10,color="green")
plt.title("Day-wise Sales",color="green",fontsize=15)
plt.show()
```



Q4. Find Monthly sales

In [17]:

```
pizza['order_month'] =pd.DatetimeIndex (pizza['order_date']).month
pizza.loc[(pizza['order_month'] ==1), 'order_month'] = 'January'
pizza.loc[(pizza['order_month'] ==2), 'order_month'] = 'February'
pizza.loc[(pizza['order_month'] ==3), 'order_month'] = 'March'
pizza.loc[(pizza['order_month'] ==4), 'order_month'] = 'April'
pizza.loc[(pizza['order_month'] ==5), 'order_month'] = 'May'
pizza.loc[(pizza['order_month'] ==6), 'order_month'] = 'June'
pizza.loc[(pizza['order_month'] ==7), 'order_month'] = 'July'
pizza.loc[(pizza['order_month'] ==8), 'order_month'] = 'August'
pizza.loc[(pizza['order_month'] ==9), 'order_month'] = 'September'
pizza.loc[(pizza['order_month'] ==10), 'order_month'] = 'October'
pizza.loc[(pizza['order_month'] ==11), 'order_month'] = 'November'
pizza.loc[(pizza['order_month'] ==12), 'order_month'] = 'December'
pizza['order_month'].value_counts()
```

Out[17]:

```
January      4288
March        4251
November     4226
July         4212
April        4182
August       4141
October      4045
June         4044
May          4008
February     3821
September    3780
December     3622
Name: order_month, dtype: int64
```

In [18]:

```
pizza.head()
```

Out[18]:

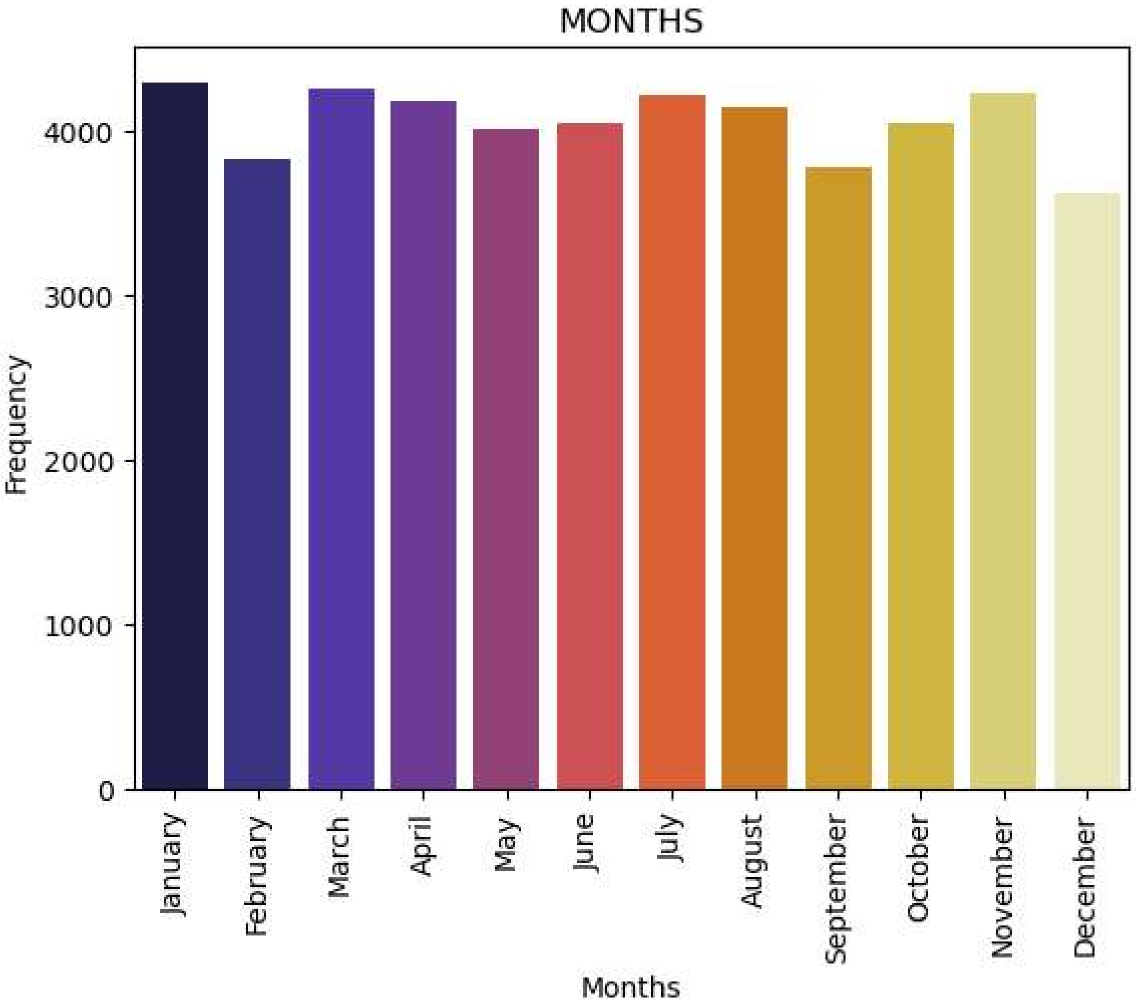
	order_details_id	order_id	pizza_id	quantity	order_date	order_time	unit_price	total_pric
0	1	1	hawaiian_m	1	2015-01-01	11:38:36	13.25	13.2
1	2	2	classic_dlx_m	1	2015-01-01	11:57:40	16.00	16.
2	3	2	five_cheese_l	1	2015-01-01	11:57:40	18.50	18.5
3	4	2	ital_supr_l	1	2015-01-01	11:57:40	20.75	20.7
4	5	2	mexicana_m	1	2015-01-01	11:57:40	16.00	16.

Plot graph for monthly sales

In [19]:

```
palette="CMRmap"
```

In [47]:
```
sns.countplot(data=pizza,x="order_month",palette="CMRmap")
plt.xticks(rotation=90)
plt.xlabel("Months",fontsize=10,color="black")
plt.ylabel("Frequency",fontsize=10,color="black")
plt.title("MONTHS",color="black")
plt.show()
```



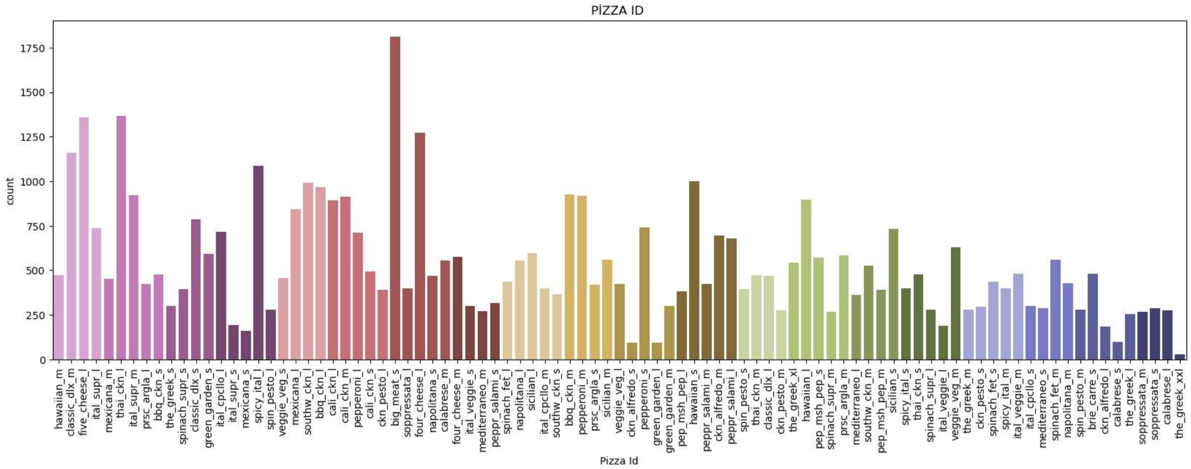
Find which pizza has highest sales

In [48]:
```
pizza.pizza_id.value_counts()
```

Out[48]:
```
big_meat_s        1811
thai_ckn_l        1365
five_cheese_l     1359
four_cheese_l     1273
classic_dlx_m     1159
                  ... 
mexicana_s         160
calabrese_s         99
ckn_alfredo_s       96
green_garden_l      94
the_greek_xxl       28
Name: pizza_id, Length: 91, dtype: int64
```

In [49]:
```
palette="tab20b_r"
```

In [23]:
```
fig, ax = plt.subplots(figsize=(20, 6))
sns.countplot(data=pizza,x="pizza_id",palette="tab20b_r",ax=ax)
plt.xticks(rotation=90)
plt.xlabel("Pizza Id",fontsize=10,color="black")
plt.title("PİZZA ID ",color="black")
plt.show()
```



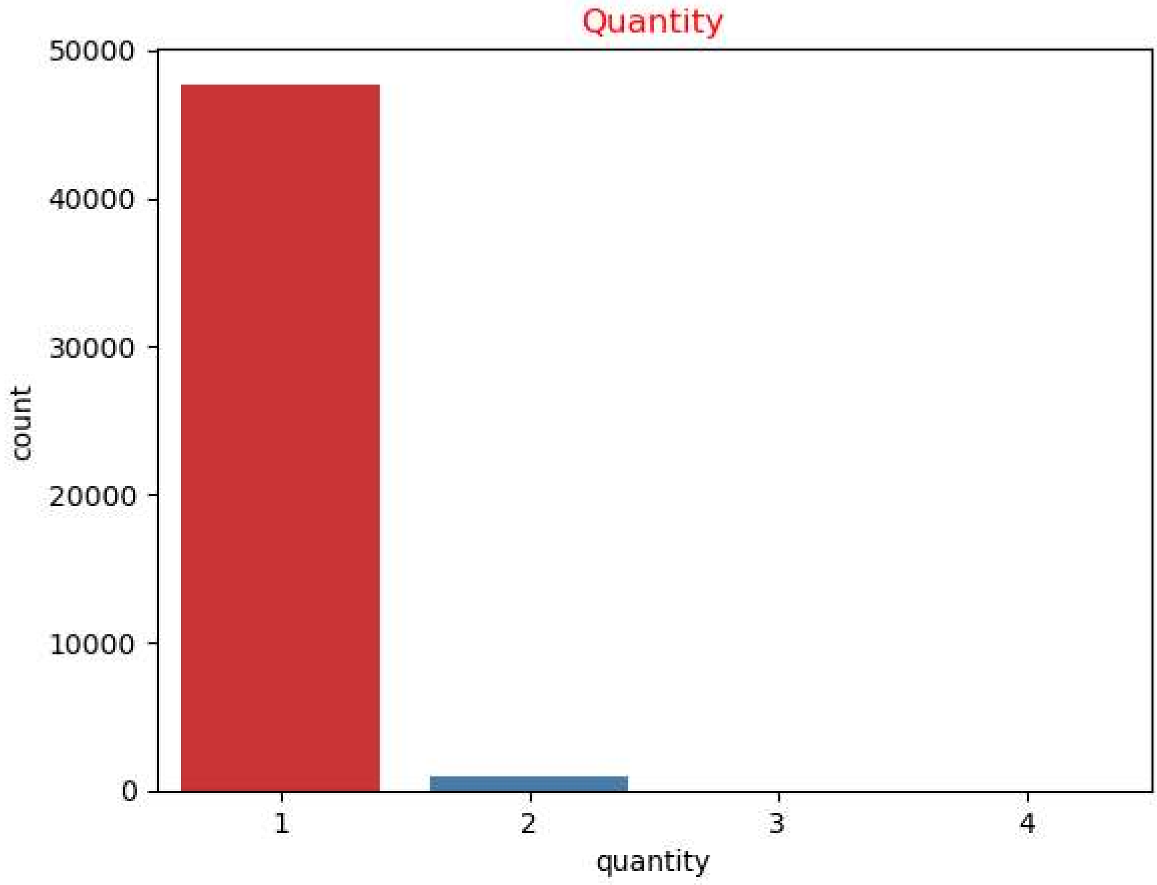
How much quantity of pizzas ordered more.

In [24]:
```
pizza.quantity.value_counts()
```

Out[24]:
```
1    47693
2      903
3       21
4        3
Name: quantity, dtype: int64
```

In [25]:
```
palette="Set1"
```

In [26]:
```
sns.countplot(data=pizza,x="quantity",palette="Set1")
plt.xlabel("quantity",fontsize=10)
plt.title("Quantity",color="red")
plt.show()
```



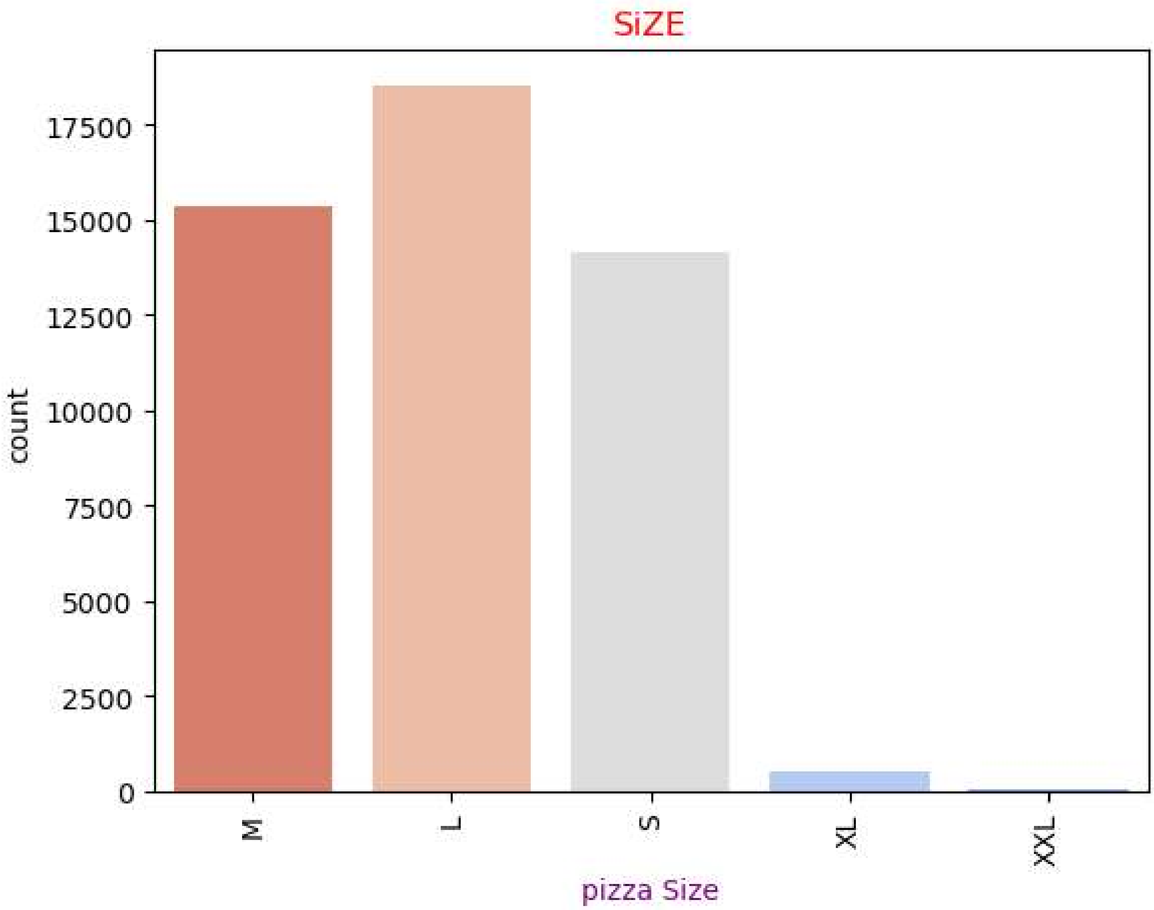
Which pizza size sales has less in number

In [27]:
```
pizza.pizza_size.value_counts().sort_values()
```

Out[27]:
```
XXL       28
XL       544
S      14137
M      15385
L      18526
Name: pizza_size, dtype: int64
```

In [28]:
```
palette="coolwarm_r"
```

In [29]:
```
sns.countplot(data=pizza,x="pizza_size",palette="coolwarm_r")
plt.xticks(rotation=90)
plt.xlabel("pizza Size",fontsize=10,color='purple')
plt.title("SiZE",color="red")
plt.show()
```

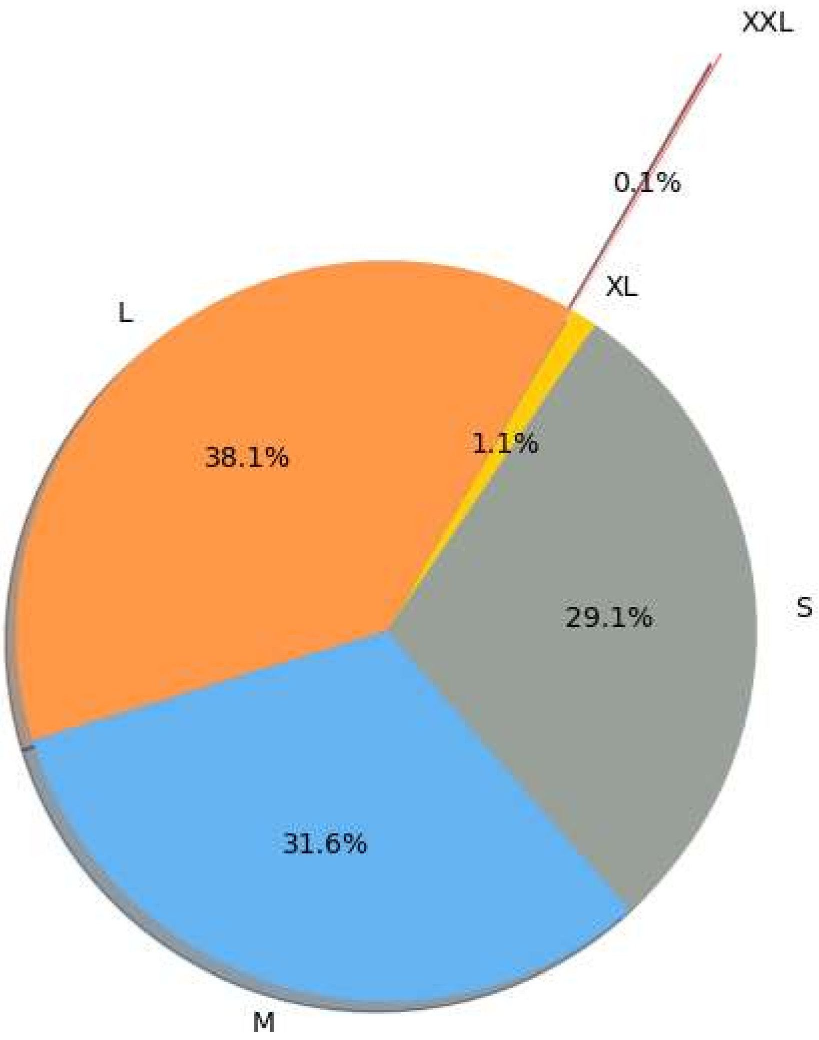


Plot the piechart with percentage sales of pizza size

In [30]:
```
colors = ['#ff9749','#66b3f1','#999f99','#ffcc09',"RED","cyan"]
```

In [31]:
```
labels = pizza["pizza_size"].value_counts().index
sizes = pizza["pizza_size"].value_counts()
plt.figure(figsize = (6,6))

colors = ['#ff9749','#66b3f1','#999f99','#ffcc09',"RED","cyan"]
plt.pie(sizes, labels=labels, rotatelabels=False, autopct='%1.1f%%',colors=col
        startangle=60,explode=(0,0,0,0,0.8))
plt.show()
```



Find which category of pizza ordered most

In [32]:
```
pizza.pizza_category.value_counts()
```

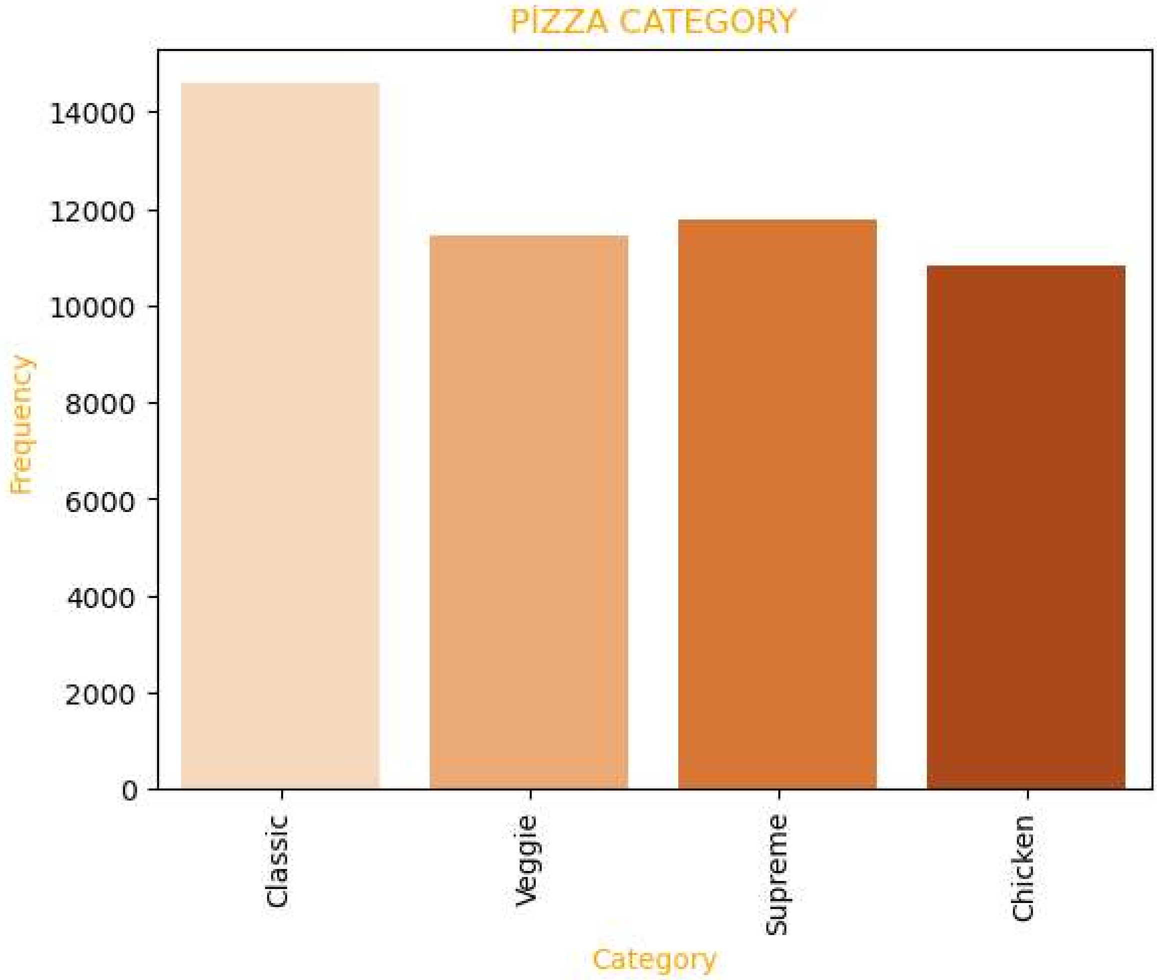
Out[32]:
```
Classic    14579
Supreme    11777
Veggie     11449
Chicken    10815
Name: pizza_category, dtype: int64
```

In [33]:

```
palette="Oranges"
```

In [34]:

```
sns.countplot(data=pizza,x="pizza_category",palette="Oranges")
plt.xticks(rotation=90)
plt.xlabel("Category",fontsize=10,color="orange")
plt.ylabel("Frequency",fontsize=10,color="orange")
plt.title("PİZZA CATEGORY",color="orange")
plt.show()
```



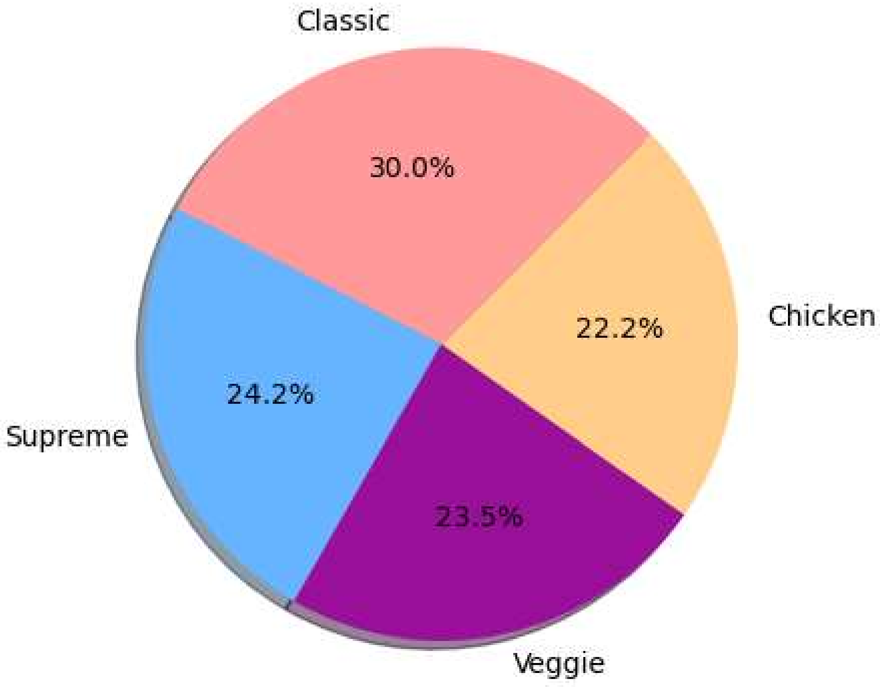
Plot the piechart which shows the percentage of sales

In [35]:

```
colors = ['#ff9999','#66b3ff','#990f99','#ffcc89',"pink","yellow"]
```

In [36]:

```
labels = pizza["pizza_category"].value_counts().index
sizes = pizza["pizza_category"].value_counts()
colors = ['#ff9999','#66b3ff','#990f99','#ffcc89',"pink","yellow"]
plt.pie(sizes, labels=labels, rotatelabels=False, autopct='%1.1f%%',colors=col
plt.show()
```



Get the value counts for pizza ingredients

In [37]:

```
pizza.pizza_ingredients.value_counts()
```

Out[37]:

```
Pepperoni, Mushrooms, Red Onions, Red Peppers, Bacon
2416
Barbecued Chicken, Red Peppers, Green Peppers, Tomatoes, Red Onions, Barbecue
Sauce                      2372
Sliced Ham, Pineapple, Mozzarella Cheese
2370
Mozzarella Cheese, Pepperoni
2369
Chicken, Pineapple, Tomatoes, Red Peppers, Thai Sweet Chilli Sauce
2315
Chicken, Artichoke, Spinach, Garlic, Jalapeno Peppers, Fontina Cheese, Gouda
Cheese                     2302
Coarse Sicilian Salami, Tomatoes, Green Olives, Luganega Sausage, Onions, Gar
lic                        1887
Capocollo, Tomatoes, Goat Cheese, Artichokes, Peperoncini verdi, Garlic
1887
Chicken, Tomatoes, Red Peppers, Red Onions, Jalapeno Peppers, Corn, Cilantro,
Chipotle Sauce             1885
Ricotta Cheese, Gorgonzola Piccante Cheese, Mozzarella Cheese, Parmigiano Reg
giano Cheese, Garlic       1850
Calabrese Salami, Capocollo, Tomatoes, Red Onions, Green Olives, Garlic
1849
Bacon, Pepperoni, Italian Sausage, Chorizo Sausage
1811
Mushrooms, Tomatoes, Red Peppers, Green Peppers, Red Onions, Zucchini, Spinac
h, Garlic                  1510
Tomatoes, Red Peppers, Jalapeno Peppers, Red Onions, Cilantro, Corn, Chipotle
Sauce, Garlic              1456
Tomatoes, Anchovies, Green Olives, Red Onions, Garlic
1451
Spinach, Mushrooms, Red Onions, Feta Cheese, Garlic
1432
Prosciutto di San Daniele, Arugula, Mozzarella Cheese
1428
Genoa Salami, Capocollo, Pepperoni, Tomatoes, Asiago Cheese, Garlic
1422
Capocollo, Red Peppers, Tomatoes, Goat Cheese, Garlic, Oregano
1414
Kalamata Olives, Feta Cheese, Tomatoes, Garlic, Beef Chuck Roast, Red Onions
1406
Mozzarella Cheese, Provolone Cheese, Smoked Gouda Cheese, Romano Cheese, Blue
Cheese, Garlic             1359
Pepperoni, Mushrooms, Green Peppers
1342
Spinach, Mushrooms, Tomatoes, Green Olives, Feta Cheese
987
Chicken, Red Onions, Red Peppers, Mushrooms, Asiago Cheese, Alfredo Sauce
980
Eggplant, Artichokes, Tomatoes, Zucchini, Red Peppers, Garlic, Pesto Sauce
975
Chicken, Tomatoes, Red Peppers, Spinach, Garlic, Pesto Sauce
961
Spinach, Artichokes, Tomatoes, Sun-dried Tomatoes, Garlic, Pesto Sauce
957
Soppressata Salami, Fontina Cheese, Mozzarella Cheese, Mushrooms, Garlic
957
Spinach, Red Onions, Pepperoni, Tomatoes, Artichokes, Kalamata Olives, Garli
```

```
c, Asiago Cheese          940
惼duja Salami, Pancetta, Tomatoes, Red Onions, Friggitello Peppers, Garlic
927
Spinach, Artichokes, Kalamata Olives, Sun-dried Tomatoes, Feta Cheese, Plum T
omatoes, Red Onions      923
Brie Carre Cheese, Prosciutto, Caramelized Onions, Pears, Thyme, Garlic
480
Name: pizza_ingredients, dtype: int64
```

Find Total Money Earned From Pizza Categories and also plot pie chart

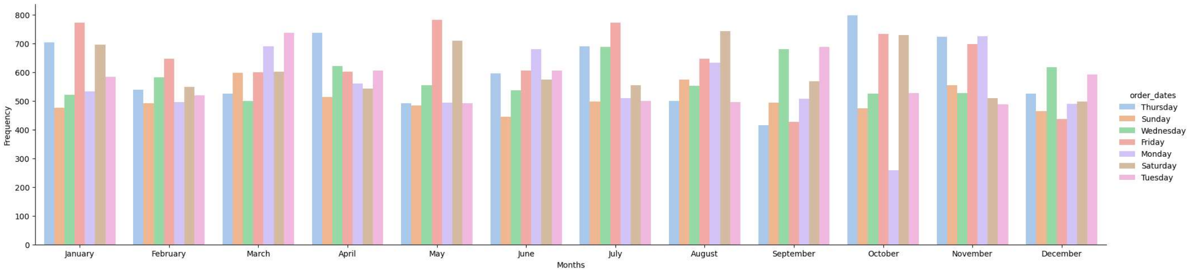
In [67]:

```
z=pizza['pizza_category'].value_counts()
fig=px.bar(z,x=z.index,y=z.values,color=z.index,text=z.values,labels={'index':
fig.show()
fig=px.pie(z,names=z.index,values=z.values,labels={'index':'pizza_category','y
fig.show()
```

Day-wise orders placed in every month

In [51]:
```
palette="pastel"
```

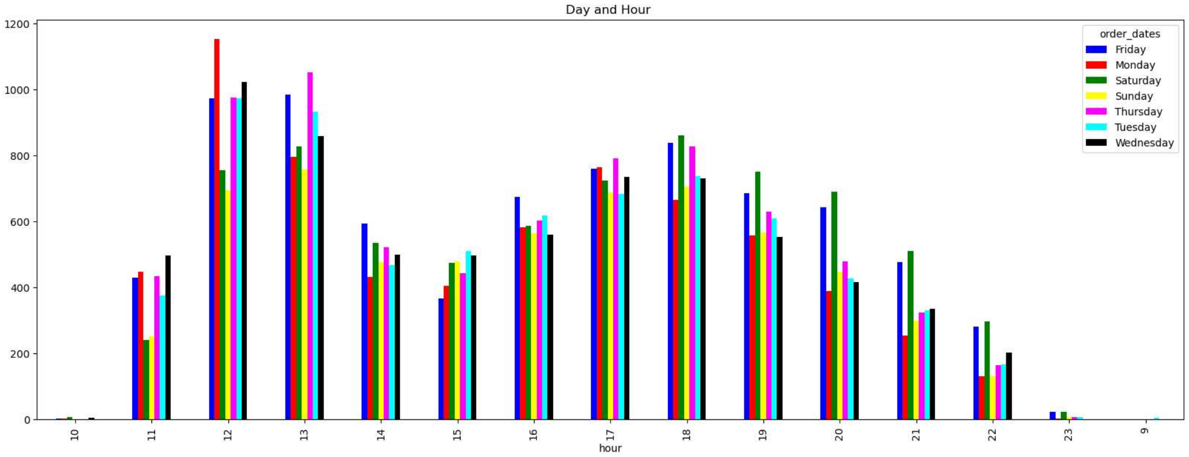
In [52]:
```
g = sns.catplot(x="order_month", data=pizza, aspect=4.0, kind='count',hue='ord
g.set_ylabels('Frequency')
g.set_xlabels("Months")
plt.show()
```



Daily hour-wise sales of pizza

In [53]:
```
color=["blue","red","green","yellow","magenta","cyan","black","orange"]
```

In [54]:
```
pd.crosstab(pizza["hour"], pizza["order_dates"]).plot(kind="bar", figsize=(20,
                                                      color=["blue","red","green","y
                                                      title="Day and Hour ")
plt.show()
```



Which pizza size earns more money

In [55]:
```
pizzaEarn = pizza.groupby('pizza_size')['total_price'].sum()
pizzaEarn
```

Out[55]:
```
pizza_size
L      375318.70
M      249382.25
S      178076.50
XL      14076.00
XXL      1006.60
Name: total_price, dtype: float64
```

In [56]:
```
profitable_Pizza = pizzaEarn.idxmax()
print("The most profitable pizza size is:", profitable_Pizza)
```

```
The most profitable pizza size is: L
```

Answers of the following question

1. What days and times do we tend to be busiest?
2. How many pizzas are we making during peak periods?
3. What are our best and worst-selling pizzas?
4. What's our average order value?
5. How well are we utilizing our seating capacity? (we have 15 tables and 60 seats)

Ques 1. What days and times do we tend to be busiest?

Answer:The day in which we tend to be busiest is :FRIDAY and the time is between 12-13 PM

Ques 2. How many pizzas are we making during peak periods?

In [57]:
```
# Taking busiest times as Peak Periods
peakPeriods=pizza["hour"].value_counts().head(2)
total_pizzas_ordered=peakPeriods.values.sum()
print(f'During peak periods, we are making {total_pizzas_ordered} pizzas in to
```

```
During peak periods, we are making 12746 pizzas in total.
```

Answer During peak periods, we are making 37054 pizzas in total

Ques 3. What are our best and worst-selling pizzas?

In [58]:

```
c = pizza.groupby('pizza_name')['quantity'].sum().reset_index()

best = c.loc[c['quantity'].idxmax()]['pizza_name']
worst = c.loc[c['quantity'].idxmin()]['pizza_name']
print(f'Our best-selling pizza is {best}, and our worst-selling pizza is {wors
```

```
Our best-selling pizza is The Classic Deluxe Pizza, and our worst-selling piz
za is The Brie Carre Pizza.
```

Answer Our best-selling pizza is The Classic Deluxe Pizza, and our worst-selling pizza is The Brie Carre Pizza.

Ques 4. What's our average order value?

In [59]:

```
average_order_value = pizza['total_price'].sum() / pizza['order_id'].nunique()
print(f'Our average order value is ${average_order_value:.2f}.')
```

```
Our average order value is $38.31.
```

Answer Our average order value is $38.31.

Ques 5. How well are we utilizing our seating capacity?(we have 15 tables and 60 seats)

In [60]:

```
table=15
seats=60
```

In [61]:

```
seats_per_table=seats/table
seats_per_table
```

Out[61]:

```
4.0
```

In [62]:
```
z=pizza['hour'].value_counts()
z
```

Out[62]:
```
12    6543
13    6203
18    5359
17    5143
19    4350
16    4185
14    3521
20    3487
15    3170
11    2672
21    2528
22    1370
23      68
10      17
9        4
Name: hour, dtype: Int64
```

In [63]:
```
x=z.values/seats
util=(x.max()/seats)*100
util
```

Out[63]:
```
181.75
```

Hence we can say that At Peak periods 109 people per seat are eating. So, At such a time seat Utilization is : 181.75%