Python Tools, Getting to know your Data, Filteration, and Visualization

1. Import the necessary libraries

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

2. Import the chipotle dataset

In [2]:
```
path = 'chipotle.tsv'

chipo = pd.read_csv(path, sep = '\t')
```

3. Load the dataset and display the first 5 rows.

In [3]:
```
chipo.head()
```

Out[3]:

	order_id	quantity	item_name	choice_description	item_price
0	1	1	Chips and Fresh Tomato Salsa	NaN	$2.39
1	1	1	Izze	[Clementine]	$3.39
2	1	1	Nantucket Nectar	[Apple]	$3.39
3	1	1	Chips and Tomatillo-Green Chili Salsa	NaN	$2.39
4	2	2	Chicken Bowl	[Tomatillo-Red Chili Salsa (Hot), [Black Beans...	$16.98

4. How many rows and columns does the dataset have?

In [4]:
```
chipo.shape
```

Out[4]:
```
(4622, 5)
```

5. What are the column names in the dataset?

In [5]:
```
chipo.columns
```

Out[5]:
```
Index(['order_id', 'quantity', 'item_name', 'choice_description',
       'item_price'],
      dtype='object')
```

6. How is the dataset indexed?

In [6]:
```
chipo.index
```

Out[6]:
```
RangeIndex(start=0, stop=4622, step=1)
```

7. Which columns are categorical and which are numerical?

In [7]:
```
categorical_cols = chipo.select_dtypes(include='object').columns
numerical_cols = chipo.select_dtypes(exclude='object').columns

print(categorical_cols)
print(numerical_cols)
```

```
Index(['item_name', 'choice_description', 'item_price'], dtype='object')
Index(['order_id', 'quantity'], dtype='object')
```

In [8]:
```
#OR
chipo.dtypes
```

Out[8]:
```
order_id               int64
quantity               int64
item_name             object
choice_description    object
item_price            object
dtype: object
```

8. Why is item_price not considered numerical?

Let us investigate that

In [9]:
```
chipo['item_price'].head()
```

Out[9]:
```
0     $2.39
1     $3.39
2     $3.39
3     $2.39
4    $16.98
Name: item_price, dtype: object
```

9. Convert item_price to a numerical (float) column

In [10]:
```
chipo['item_price'] = chipo['item_price'].str.replace('$', '').astype(float)
```

In [11]:
```
#check the data type of 'item_price'
chipo['item_price'].dtype
```

Out[11]:
```
dtype('float64')
```

10. Show basic statistics for numerical columns

In [12]:
```
chipo.describe()
```

Out[12]:

	order_id	quantity	item_price
count	4622.000000	4622.000000	4622.000000
mean	927.254868	1.075725	7.464336
std	528.890796	0.410186	4.245557
min	1.000000	1.000000	1.090000
25%	477.250000	1.000000	3.390000
50%	926.000000	1.000000	8.750000
75%	1393.000000	1.000000	9.250000
max	1834.000000	15.000000	44.250000

Sorting and Filtering Data

11. How many products cost more than $10.00?

In [13]:
```
chipo[chipo.item_price > 10.00]['order_id'].count()
```

Out[13]:
```
np.int64(1130)
```

In [14]:
```
# OR you can use size
chipo[chipo.item_price > 10.00]['order_id'].size
```

Out[14]:
```
1130
```

In [15]:
```
print(chipo[chipo.item_price > 10.00]['order_id'].count())
```

```
1130
```

Important Notes The difference between `size` and `count()` in Pandas:

- `size` measures total entries, while `count()` measures valid (non-null) entries.

- `size` returns a single integer (total elements), while `count()` returns a series (per-column counts in a DataFrame) or a single integer (for a Series).

12. What is the price of each item?

A simple way to do that is to get the data frame with only two columns, item_name and item_price

In [16]:
```
prices = chipo[['item_name', 'item_price']]
prices
```

Out[16]:

	item_name	item_price
0	Chips and Fresh Tomato Salsa	2.39
1	Izze	3.39
2	Nantucket Nectar	3.39
3	Chips and Tomatillo-Green Chili Salsa	2.39
4	Chicken Bowl	16.98
...	...	...
4617	Steak Burrito	11.75
4618	Steak Burrito	11.75
4619	Chicken Salad Bowl	11.25
4620	Chicken Salad Bowl	8.75
4621	Chicken Salad Bowl	8.75

4622 rows × 2 columns

13. Sort the dataset by the item name

In [17]:
```
chipo.item_name.sort_values()
```

Out[17]:
```
3389    6 Pack Soft Drink
341     6 Pack Soft Drink
1849    6 Pack Soft Drink
1860    6 Pack Soft Drink
2713    6 Pack Soft Drink
              ...
2384    Veggie Soft Tacos
781     Veggie Soft Tacos
2851    Veggie Soft Tacos
1699    Veggie Soft Tacos
1395    Veggie Soft Tacos
Name: item_name, Length: 4622, dtype: object
```

In [18]:
```
# OR
chipo.sort_values(by = "item_name")
```

Out[18]:

	order_id	quantity	item_name	choice_description	item_price
3389	1360	2	6 Pack Soft Drink	[Diet Coke]	12.98
341	148	1	6 Pack Soft Drink	[Diet Coke]	6.49
1849	749	1	6 Pack Soft Drink	[Coke]	6.49
1860	754	1	6 Pack Soft Drink	[Diet Coke]	6.49
2713	1076	1	6 Pack Soft Drink	[Coke]	6.49
...	...	...	...	...	...
2384	948	1	Veggie Soft Tacos	[Roasted Chili Corn Salsa, [Fajita Vegetables,...	8.75
781	322	1	Veggie Soft Tacos	[Fresh Tomato Salsa, [Black Beans, Cheese, Sou...	8.75
2851	1132	1	Veggie Soft Tacos	[Roasted Chili Corn Salsa (Medium), [Black Bea...	8.49
1699	688	1	Veggie Soft Tacos	[Fresh Tomato Salsa, [Fajita Vegetables, Rice,...	11.25
1395	567	1	Veggie Soft Tacos	[Fresh Tomato Salsa (Mild), [Pinto Beans, Rice...	8.49

4622 rows × 5 columns

14. What is the quantity of the most expensive item ordered?

In [19]:
```
chipo.sort_values(by = "item_price", ascending = False)['quantity'].head(1)
```

Out[19]:
```
3598    15
Name: quantity, dtype: int64
```

In [20]:
```
# OR
chipo[chipo['item_price'] == max(chipo['item_price'])]['quantity']
```

Out[20]:
```
3598    15
Name: quantity, dtype: int64
```

As you saw above, the above way returns a series with both the index and the value. If you want just the value without the index, you can extract it in a few different ways:

In [21]:
```
chipo.sort_values(by="item_price", ascending=False)['quantity'].head(1).values[0]
```

Out[21]:
```
np.int64(15)
```

In [22]:
```
chipo.sort_values(by="item_price", ascending=False)['quantity'].iloc[0]
```

Out[22]:
```
np.int64(15)
```

In [23]:
```
chipo.sort_values(by="item_price", ascending=False)['quantity'].head(1).item()
```

Out[23]:
```
15
```

15. How many times was a Veggie Salad Bowl ordered?

In [24]:
```
print(chipo[chipo.item_name == "Veggie Salad Bowl"]['quantity'].sum())
```

```
18
```

16. How many times did someone order more than one Canned Soda?

In [25]:
```
condition = (chipo.item_name == "Canned Soda") & (chipo.quantity > 1)
```

In [26]:
```
chipo[condition]['quantity'].count()
```

Out[26]: np.int64(20)

17. How many different products are sold?

In [27]:
```
unique_products = chipo['item_name'].nunique()

print(unique_products)
```

```
50
```

18. What is the total revenue?

In [28]:
```
total_revenue = (chipo['item_price'] * chipo['quantity']).sum()

print(round(total_revenue))
```

```
39237
```

19. What is the average price of items?

In [29]:
```
average_price = chipo['item_price'].mean()

print(round(average_price, 2))
```

```
7.46
```

20. How many orders were made in total?

In [30]:
```
total_orders = chipo['order_id'].nunique()

print(total_orders)
```

```
1834
```

21. What is the total quantity of items ordered?

In [31]:
```
total_quantity = chipo['quantity'].sum()

print(total_quantity)
```

```
4972
```

22. Which item has the highest average price?

In [32]:
```
chipo.groupby('item_name')['item_price'].mean().idxmax()
```

Out[32]:
```
'Bowl'
```

23. How many items include “Chicken” in their name?

In [33]:
```
chipo[chipo['item_name'].str.contains('Chicken')]['item_name'].count()
```

Out[33]:
```
np.int64(1560)
```

In [34]:
```
chicken_items = chipo[chipo['item_name'].str.contains('Chicken')]['item_name'].count()

print(chicken_items)
```

```
1560
```

24. Which item was the most-ordered item?

In [35]:
```
chipo.groupby('item_name')['quantity'].sum().idxmax()
```

Out[35]:
```
'Chicken Bowl'
```

In [36]:
```
#Option 2
c = chipo.groupby('item_name')
c = c.sum()
c = c.sort_values(['quantity'], ascending=False)
c.reset_index().item_name.head(1)
```

Out[36]:
```
0    Chicken Bowl
Name: item_name, dtype: object
```

25. Group the dataset by item_name and count how many times each product appears.

In [37]:
```
chipo.groupby('item_name').size().sort_values(ascending=False)
```

Out[37]:

item_name	
Chicken Bowl	726
Chicken Burrito	553
Chips and Guacamole	479
Steak Burrito	368
Canned Soft Drink	301
Steak Bowl	211
Chips	211
Bottled Water	162
Chicken Soft Tacos	115
Chicken Salad Bowl	110
Chips and Fresh Tomato Salsa	110
Canned Soda	104
Side of Chips	101
Veggie Burrito	95
Barbacoa Burrito	91
Veggie Bowl	85
Carnitas Bowl	68
Barbacoa Bowl	66
Carnitas Burrito	59
Steak Soft Tacos	55
6 Pack Soft Drink	54
Chips and Tomatillo Red Chili Salsa	48
Chicken Crispy Tacos	47
Chips and Tomatillo Green Chili Salsa	43
Carnitas Soft Tacos	40
Steak Crispy Tacos	35
Chips and Tomatillo-Green Chili Salsa	31
Steak Salad Bowl	29
Nantucket Nectar	27
Barbacoa Soft Tacos	25
Chips and Roasted Chili Corn Salsa	22
Chips and Tomatillo-Red Chili Salsa	20
Izze	20
Veggie Salad Bowl	18
Chips and Roasted Chili-Corn Salsa	18
Barbacoa Crispy Tacos	11
Barbacoa Salad Bowl	10
Chicken Salad	9
Carnitas Crispy Tacos	7
Veggie Soft Tacos	7
Burrito	6

```
Veggie Salad                              6
Carnitas Salad Bowl                       6
Steak Salad                               4
Bowl                                      2
Salad                                     2
Crispy Tacos                              2
Chips and Mild Fresh Tomato Salsa         1
Carnitas Salad                            1
Veggie Crispy Tacos                       1
dtype: int64
```

26. calculate the total quantity sold for each product.

In [38]:
```
item_quantity = chipo.groupby('item_name')['quantity'].sum()
item_quantity
```

Out[38]:

item_name	
6 Pack Soft Drink	55
Barbacoa Bowl	66
Barbacoa Burrito	91
Barbacoa Crispy Tacos	12
Barbacoa Salad Bowl	10
Barbacoa Soft Tacos	25
Bottled Water	211
Bowl	4
Burrito	6
Canned Soda	126
Canned Soft Drink	351
Carnitas Bowl	71
Carnitas Burrito	60
Carnitas Crispy Tacos	8
Carnitas Salad	1
Carnitas Salad Bowl	6
Carnitas Soft Tacos	40
Chicken Bowl	761
Chicken Burrito	591
Chicken Crispy Tacos	50
Chicken Salad	9
Chicken Salad Bowl	123
Chicken Soft Tacos	120
Chips	230
Chips and Fresh Tomato Salsa	130
Chips and Guacamole	506
Chips and Mild Fresh Tomato Salsa	1
Chips and Roasted Chili Corn Salsa	23
Chips and Roasted Chili-Corn Salsa	18
Chips and Tomatillo Green Chili Salsa	45
Chips and Tomatillo Red Chili Salsa	50
Chips and Tomatillo-Green Chili Salsa	33
Chips and Tomatillo-Red Chili Salsa	25
Crispy Tacos	2
Izze	20
Nantucket Nectar	29
Salad	2
Side of Chips	110
Steak Bowl	221
Steak Burrito	386
Steak Crispy Tacos	36

```
Steak Salad                             4
Steak Salad Bowl                       31
Steak Soft Tacos                       56
Veggie Bowl                            87
Veggie Burrito                         97
Veggie Crispy Tacos                     1
Veggie Salad                            6
Veggie Salad Bowl                      18
Veggie Soft Tacos                       8
Name: quantity, dtype: int64
```

27. What is the average quantity of items per order?

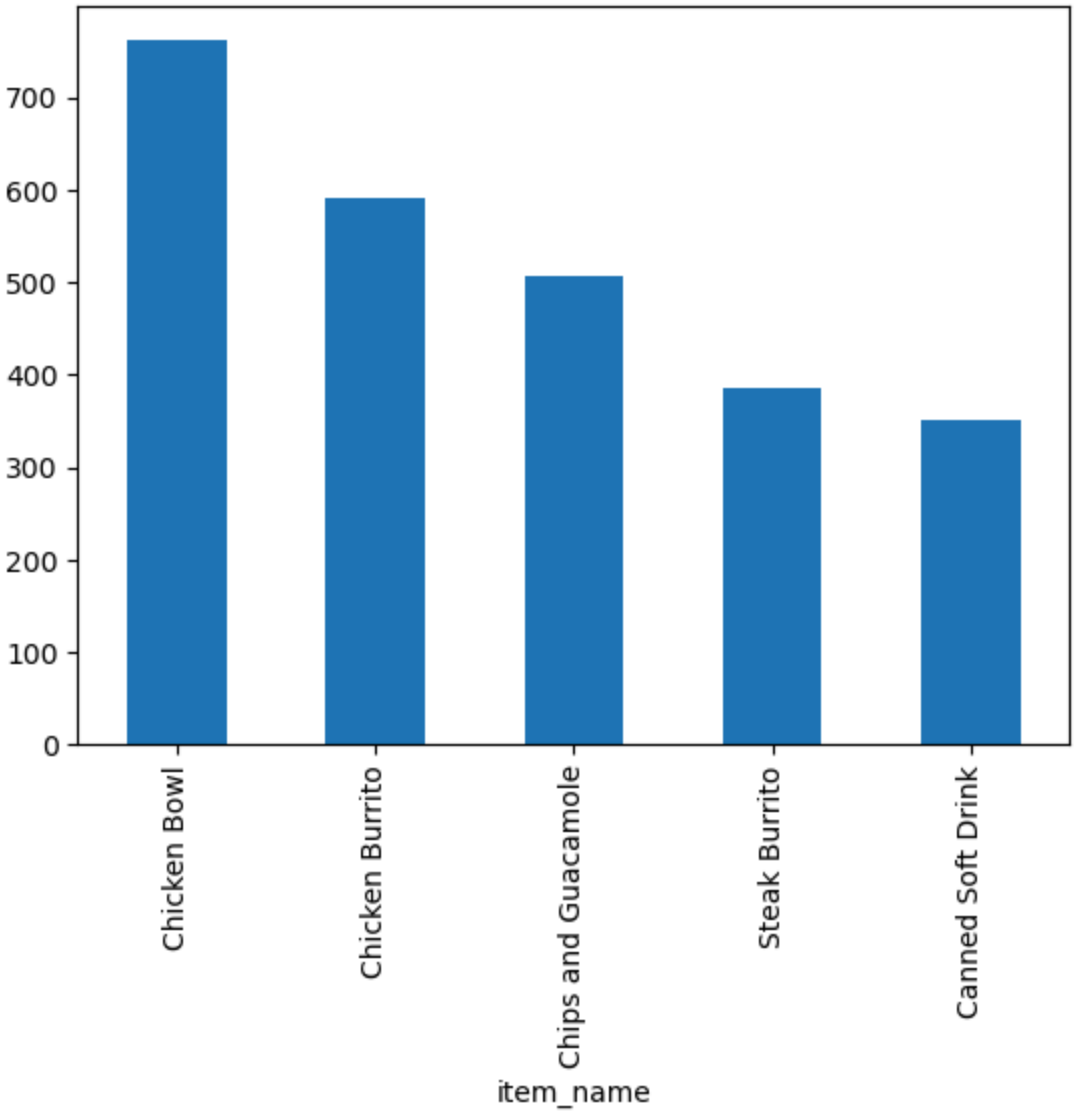
In [39]:
```
avg_items_per_order = chipo.groupby('order_id')['quantity'].mean()
avg_items_per_order
```

Out[39]:
```
order_id
1       1.0
2       2.0
3       1.0
4       1.0
5       1.0
       ...
1830    1.0
1831    1.0
1832    1.0
1833    1.0
1834    1.0
Name: quantity, Length: 1834, dtype: float64
```

Visualization

28. Plot the top 5 most ordered items.

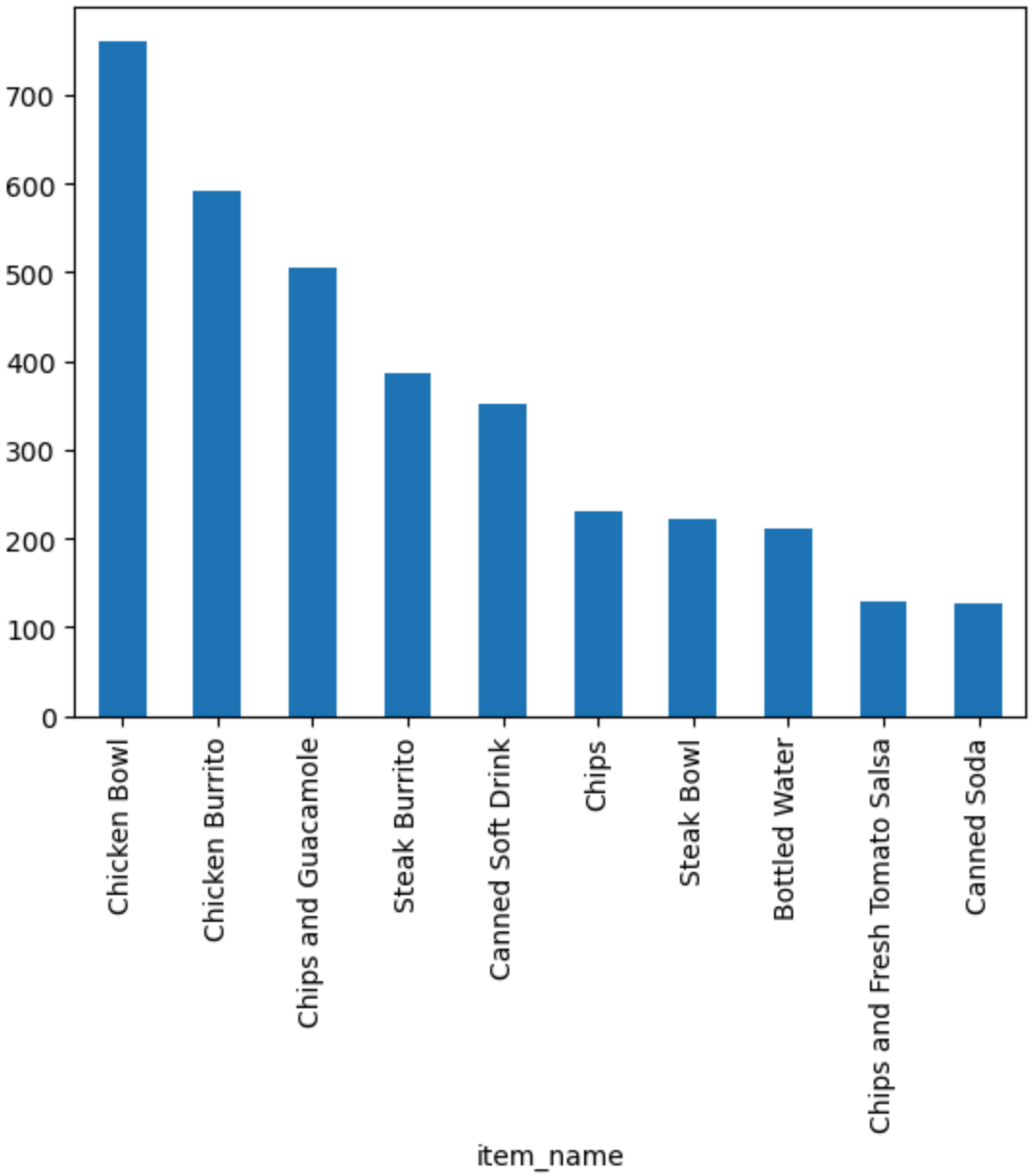
In [40]:
```
top5 = chipo.groupby('item_name')['quantity'].sum().sort_values(ascending=False).head(5)
top5.plot(kind='bar');
```



29. Plot the total quantity sold for the top 10 items.

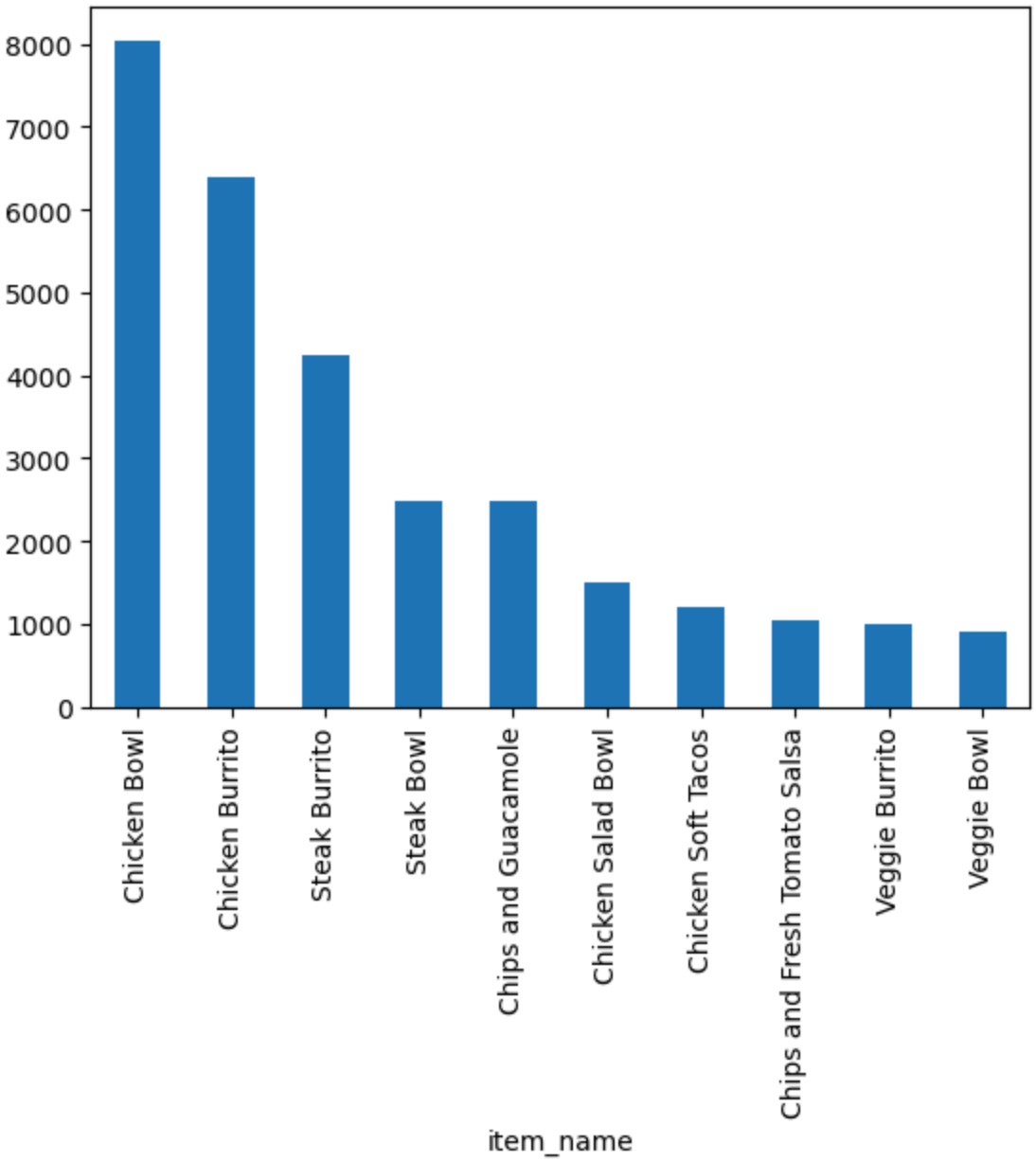
Same as Q28, but with different wording.

In [41]:
```
top10 = chipo.groupby('item_name')['quantity'].sum().sort_values(ascending=False).head(10)
top10.plot(kind='bar');
```



30. Calculate the total revenue generated by each item and plot the top 10 highest-revenue items.

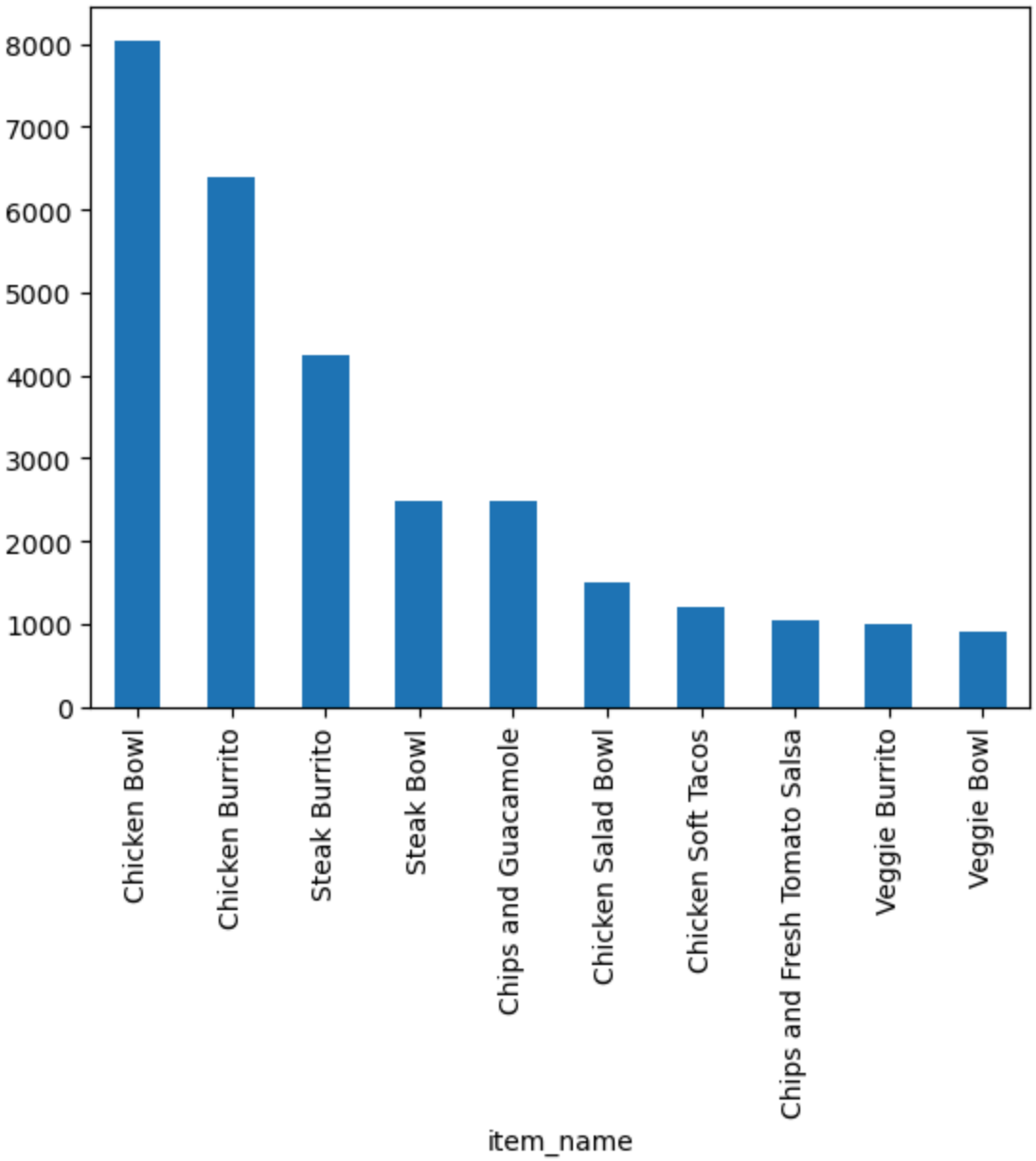
In [42]:
```
# Option 1
#Create a revenue column
chipo['revenue'] = chipo['item_price']*chipo['quantity']
#groupby revenue and sum, and then plot
chipo.groupby('item_name')['revenue'].sum().sort_values(ascending=False).head(10).plot(kind='bar');
```



In [43]:
```
#Option 2
# Calculate revenue per item
revenue = (chipo['item_price'] * chipo['quantity']).groupby(chipo['item_name']).sum()
```

```
# Sort and get top 10 items
top10_revenue = revenue.sort_values(ascending=False).head(10)

# Plot
top10_revenue.plot(kind='bar');
```



💡 Challenge yourself

31. What was the most ordered item in the choice_description column?

In [ ]:

32. What is the average revenue amount per order?

In [ ]:

33. Which product has the highest total quantity sold?

In [ ]:

34. calculate the average price of each product.

In [ ]:

35. Which choice appears most often?

In [ ]: