## Lab 5: Collecting Quantitative Data

Introduction
Your activity is to collect quantitative data using a survey tool. You will analyze the data during the next lab.

Learning Objectives

1. Learn how to collect quantitative data using a survey tool
2. Gain an understanding of different types of data

Assessment
To get full credit, you will need to create a survey that:

1. Has a specific topic or theme (not random questions)
2. Has 10 questions
3. Collects data from 25 participants
4. Has four categories of data

   1. Binary
   2. Nominal
   3. Ordinal
   4. Interval or Ratio

Data Types Overview

- **Binary**: Nominal attribute with only 2 states (0 and 1)

  - Male/Female; Yes/No

- **Nominal**: categories, states, or "names of things"

  - Hair_color = {auburn, black, blond, brown, grey, red, white}
  - Group number; zip codes

- **Ordinal**: Values have a meaningful order (ranking) but the difference between the values is not known.

  - Size = (small, medium, large); grade levels in school, military ranking, number of times a day

- **Interval**: Measured on a scale of equal-sized units, but no true zero-point.

  - Time, temperature in C or F, IQ test, age/dates, 5th grade,

- **Ratio**: Measured on a scale of equal-sized units, with a true zero-point.

  - Weight, height, distance, the Kelvin scale: 50 K is twice as hot as 25 K., number of siblings

## Task 1: Chose a survey topic

1.      There is an unlimited number of topics that you can choose. Find something of interest to you. Here are some ideas to get you thinking.

- **Demographics (data about a population of people)**
- Age, gender, language, physical characteristics, where they live, preference of technology, mode of transportation, etc.
- Be careful about asking personal questions
- **About education**
- How many hours a week they spend studying, their favorite subject, preference of food in the school cafeteria, favorite teacher, do they like their department (what they study)
- **Entertainment, activities**
- Do they play computer games, how many hours they spend playing games, watching movies, reading, etc, favorite sport
- **Travel**
- Have they traveled to another country, been another oblast' capital, stayed in a hotel, what is the longest bus ride they took, what mode of transportation do they prefer (bus, train, airplane)
- **Food**
- Opinion about a current topic or a range of topics
- How do you rank the effectiveness of your president, should smoking be allowed inside, cleanliness of the city

2.      Think about the type of data that you will gather. Your survey should collect data on four of these categories.

- **Binary data**:
- Yes/No; M/F
- **Nominal**:
- Which do you prefer? Bananas, peaches, or apples;
- **Ordinal**:
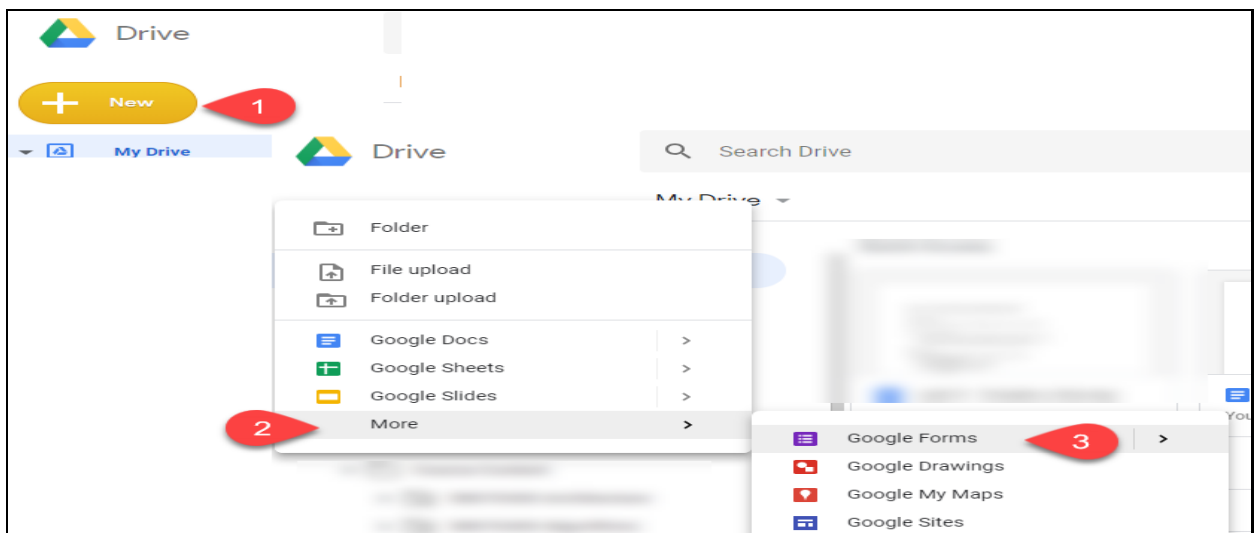- **Opinion data:** On a scale of 1-5, what do you think about…
- **Factual data**: What grade did you get in ICT last rating (A,B,C)? What floor is your flat on?

- **Interval**:
- How long does it take to get the university? What year were you born?
- **Ratio**:
- How tall are you? How much do you weight? How far do you live from the university?

This section describes how to create a new survey using Google Form.
1.      Navigate to https://drive.google.com
2.      Log into your Google account when prompted
1.      If you do not have a Google Account, sign up for one using any email address
(you do not need a Gmail address)
2.      For help, see Help Creating a Google Account
3.      Once logged in: Click New ➜ More ➜ Google Forms ➜ Blank Presentation



4.      Give the form a title that relates to your topic

5.	Type in your question
6.	Choose the type of question
1.	Short answer: User types in the value
1.	How old are _____
2.	Multiple choice (one possible answer)
1.	Do you attend classes on Saturday (yes / no)
2.	What do you think about….
1.	Strongly disagree
2.	Somewhat disagree
3.	Neither agree nor disagree
4.	Somewhat agree
5.	Strongly agree
3.	Checkboxes (multiple answers)
1.	What did you eat for lunch?
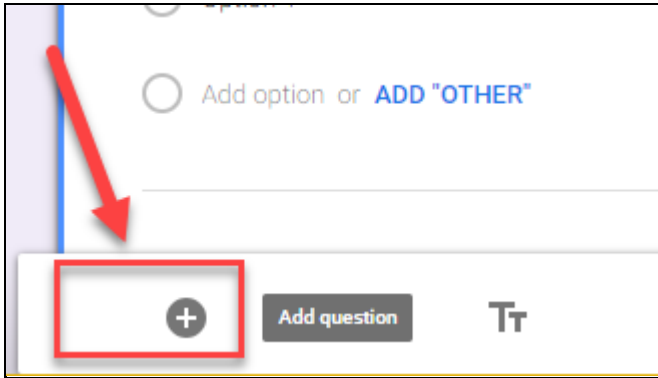1.	Salad
2.	Samsa
3.	Soup
4.	Plov



7.	Fill in the selection for the user to choose



8.

1.     Check the required box if you want them to answer the question. Otherwise, you might get a survey with missing data
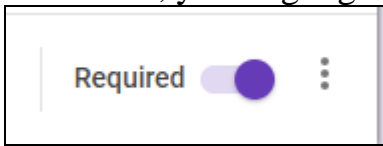


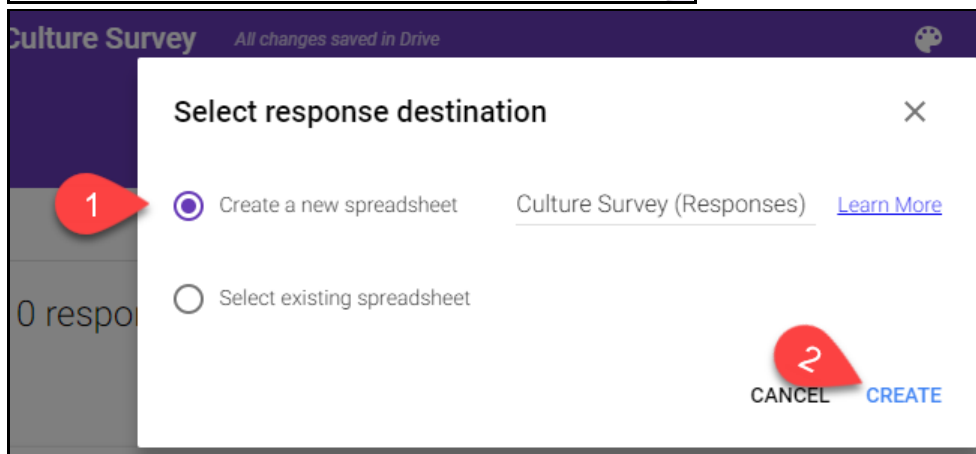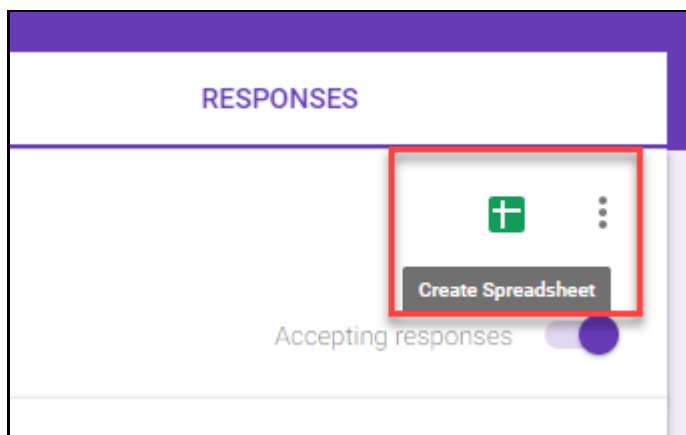9.     Click the + button to add another question.
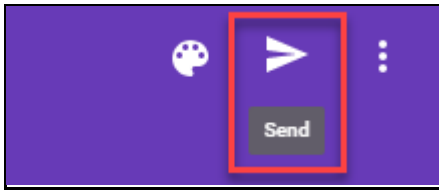


Task 3: Send your survey

When you are finished, you will want to send the survey to your friends!

1.     But first, you should link the data to a spreadsheet so you can download easily when you are done.
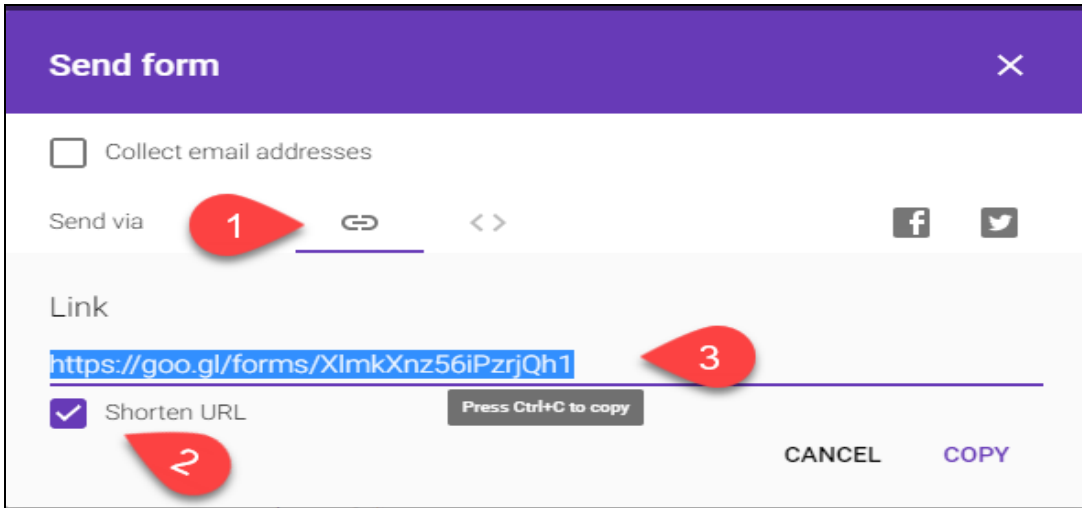
1.     **Note**: You should not change the survey once you link the survey to a spreadsheet.
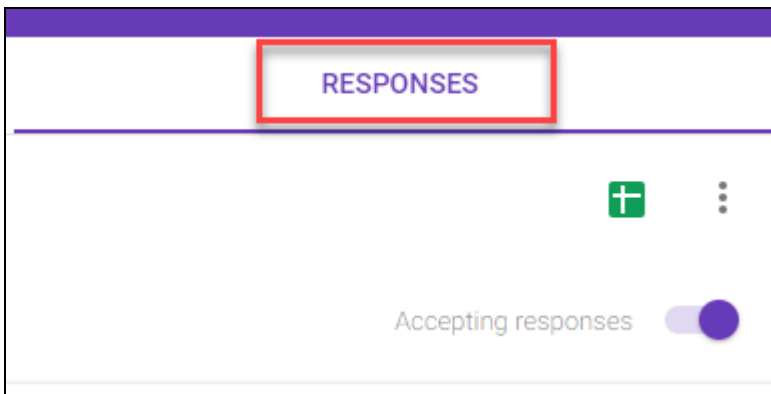
2.     Click the **Send** button



3.     Click the link icon, check the Shorten URL box, and then copy the link!



4.     You can view the number of responses by clicking the responses tab

# Lab 5b - Analyze the Survey Data

Introduction

Last week, you collected quantitative data using a survey tool. Now, you will analyze the data. You will use the Lab Excel Lab Manual to help you analyze your data.

Learning Objectives

1. Apply what you learned about creating charts and graphs
2. Learn how to analyze different data types
3. Gain an understanding of different types of data
4. Calculate the mean, mode, or median of the data

Assessment

To get full credit, you will need to:

1.
2.

Data Types Overview

- **Binary**: Nominal attribute with only 2 states (0 and 1)
  - Male/Female; Yes/No
- **Nominal**: categories, states, or "names of things"
  - Hair_color = {auburn, black, blond, brown, grey, red, white}
  - Group number; zip codes
- **Ordinal**: Values have a meaningful order (ranking) but the difference between the values is not known.
  - Size = (small, medium, large); grade levels in school, military ranking, number of times a day
- **Interval**: Measured on a scale of equal-sized units, but no true zero-point.
  - Time, temperature in C or F, IQ test, age/dates, 5th grade,
- **Ratio**: Measured on a scale of equal-sized units, with a true zero-point.
  - Weight, height, distance, the Kelvin scale: 50 K is twice as hot as 25 K., number of siblings

**Task 1: Download and code your data**

**Note**: You cannot open a **.CSV** file in Microsoft Excel if your data contains Cyrillic characters. Excel will corrupt the data if you try. You will have to download the data as an **.XLSX** file from Google Sheets.

Use Google Sheets to download the data.

1.     Click the spreadsheet icon to view the responses in Sheets
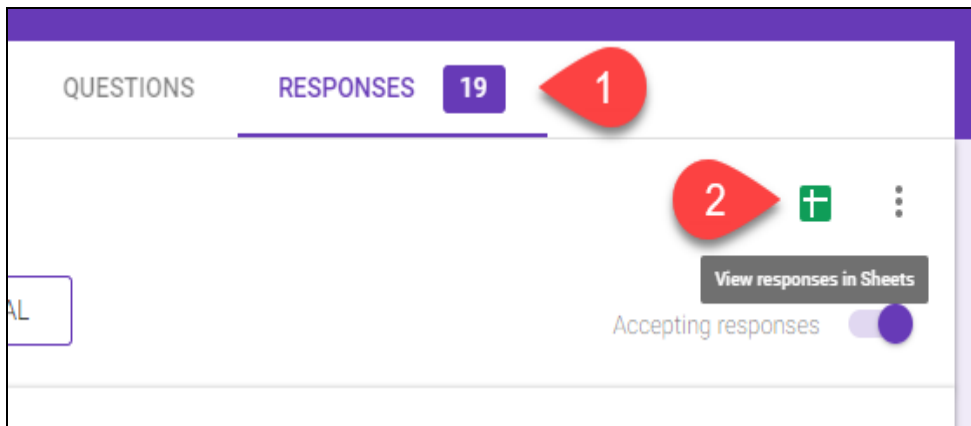


2. Download the file as Microsoft Excel
3. OR: Select "Make a copy…" if you will use Google Sheets
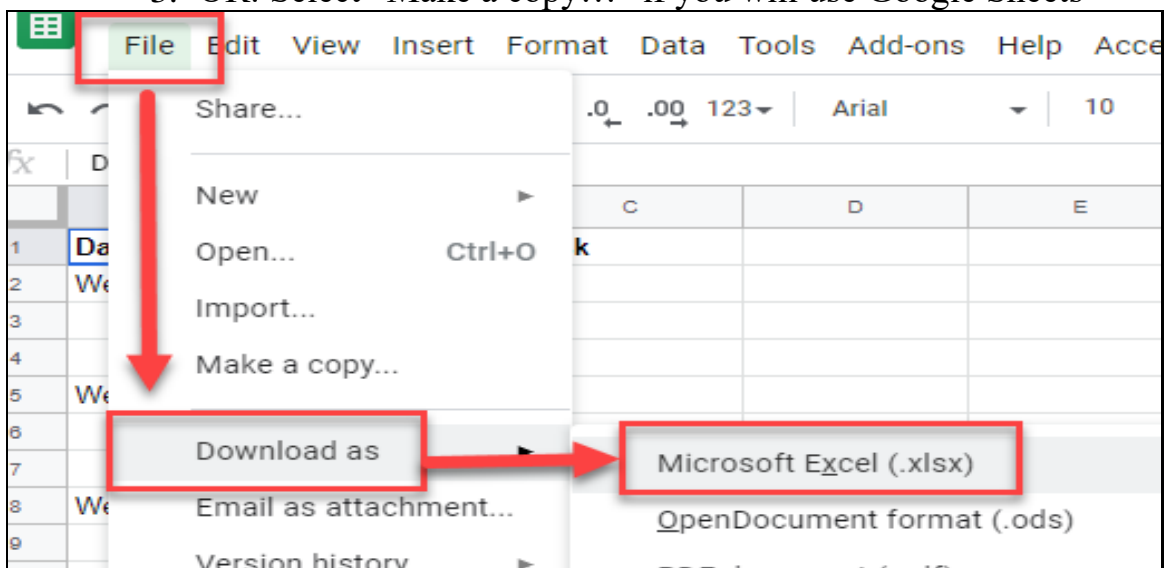


4.  Next, your raw data might not be in an acceptable form for analyzes.
5.  You will have to put it in a format that you can analyze.

**Mixed data**
**In this example here, "Everyday" and "Do not participate"** are not numbers.
Option four is "7" and option five is "0.
**You will need to change the response of "Everyday" to "7" and "Do not do" to 0**

How many times a week do you <do something>?
1.  1-2
2.  3-4
3.  5-6
4.  Everyday
5.  Do not participate

**Open-ended questions**
Open-ended questions are questions where the participant enters any text that they want. They are qualitative data, not quantitative data. These questions are that you write about in a report or you use them to support your quantitative data.

Here are examples from your surveys:

- What profession have you chosen or in what field is this profession?
- What do you like to do in your free time?
- Favorite literary hero?
- What do you think of our teachers?

How do you analyze this data? You have several options:

1. Code each response and put it into a category so you can graph them
2. Report a few of the responses that you thought were interesting or insightful
3. Summarize the main ideas of the responses

Suggestions:

1. You will have to read each response and summarize the data.
    1. For example, some people would answer Pushkin but other Пушкин.
    2. The answer is the same, but the responses are different.
2. You will have to summarize each response to questions like *What do you like to do in your free time?*.
    1. You can create broad categories based on their responses., such as: sleep, go to moves, go to the park, help my family, etc.
    2. Or, you can summarize what most people do in their free time.
3. Questions like *What profession have you chosen or in what field is this profession* Are easier.
    1. You can classify each response to a profession category.
4. For opinion questions, such as *What do you think of our teachers*:
    1. Maybe create a scale from 1-5 to rate each response. You will have multiple scales. One participant will think about the quality of education or expertise. Other participants might think about how they are as a person.
    2. Or, you can create a summary of what the students say about the teachers.

## Task 2: Graphically represent your data

Review how to calculate the mean, median, and mode.

Mode

You will use the **mode** to represent your **nominal** or **ordinal** data.

- **Nominal** data is not ordered
- **Ordinal** data is ordered. But the difference between values is not known
- You should create a **PivotChart** for this data
    - See pages 10-17 in Lab Excel Lab Manual

Mean

You will use the **mean** to represent your **interval** and **ratio** data.

- **Interval** does not have an absolute 0 starting point. 50C is **NOT** twice as hot as 25C.
- **Interval** has a true 0. 8km is twice the distance as 4km.
- Report the min, max, and mean in your chat or table

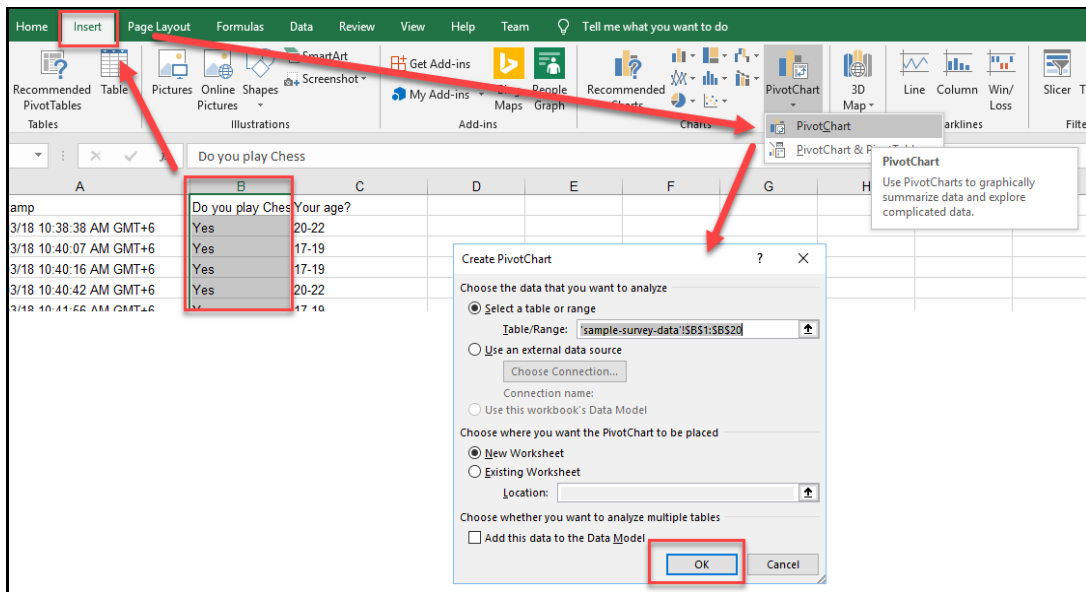# 1. How to Graph the Mode (nominal/ordinal data)

For this example, **use your binary data**.

1. The chart should show the count of each value
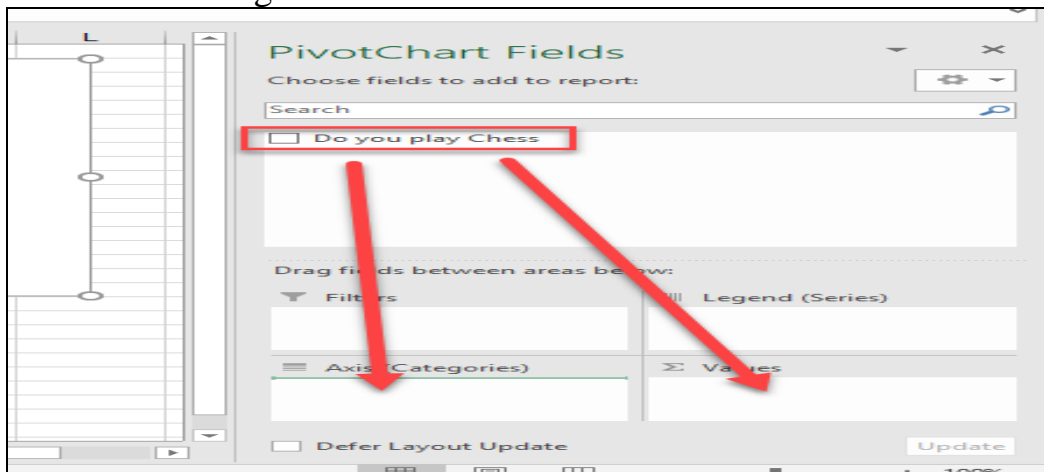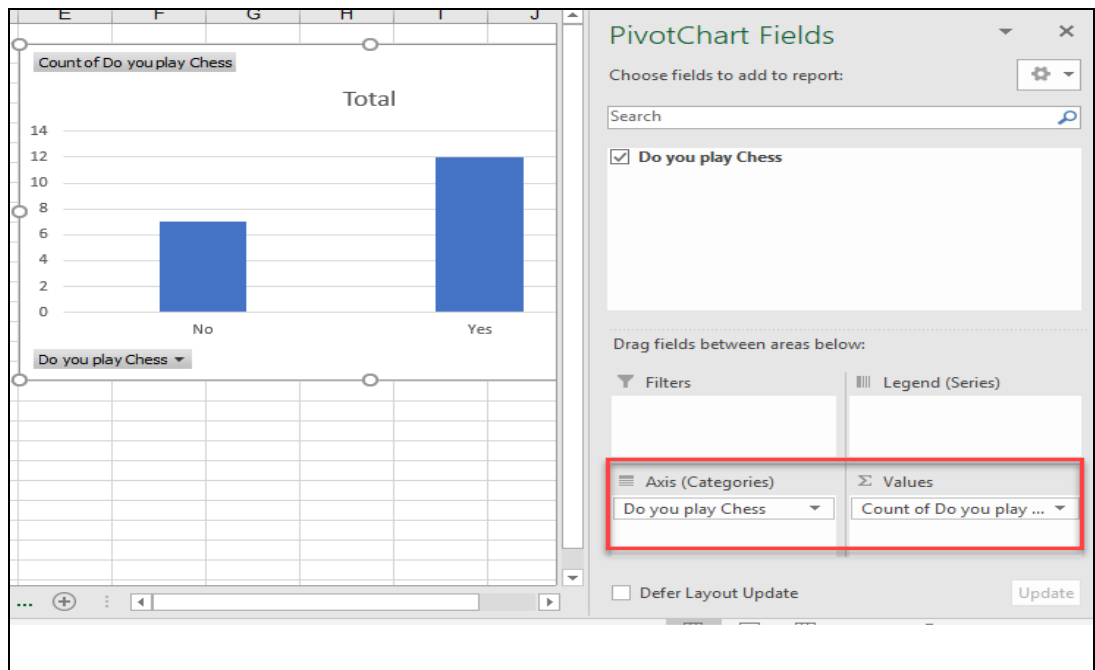2. This chat will display the mode
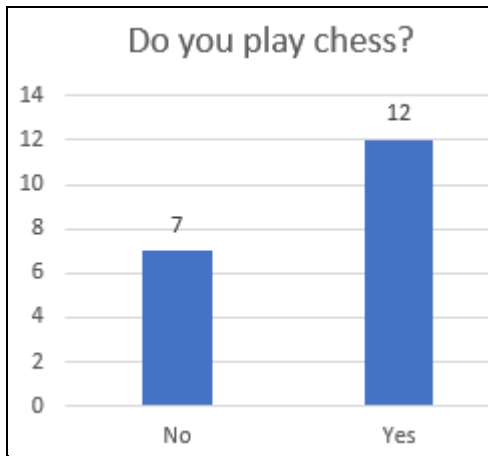


3. Create a **PivotChart**.
   1. Select the data
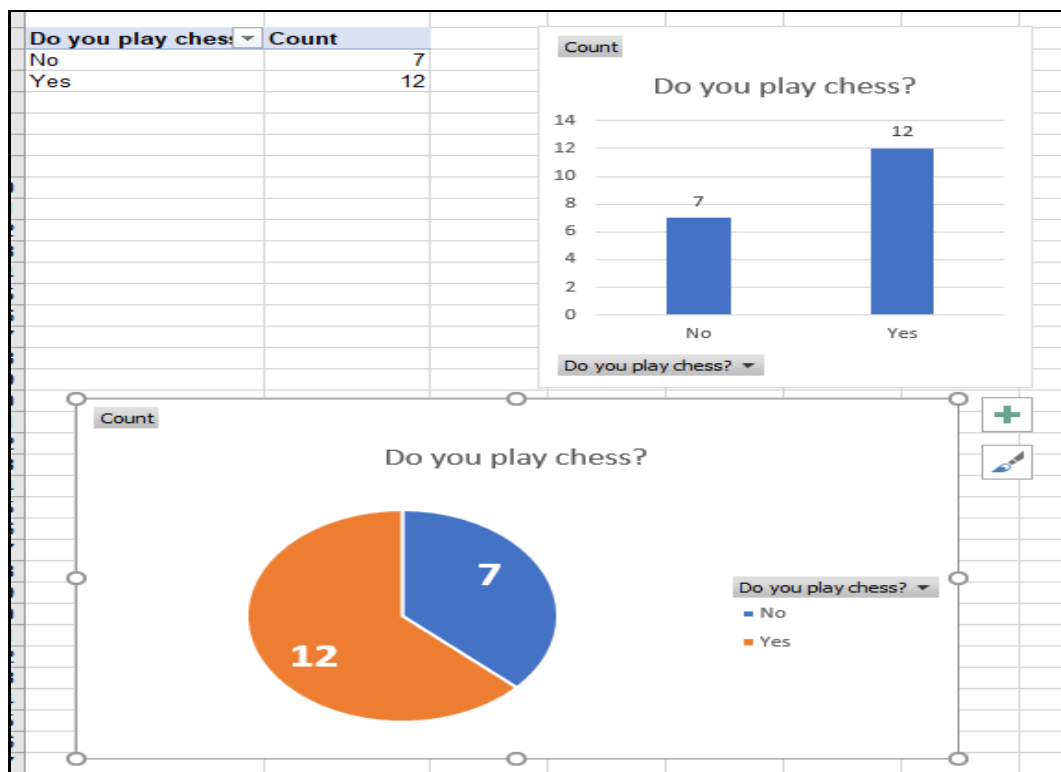   2. Insert -> PivotChart -> PivotChart



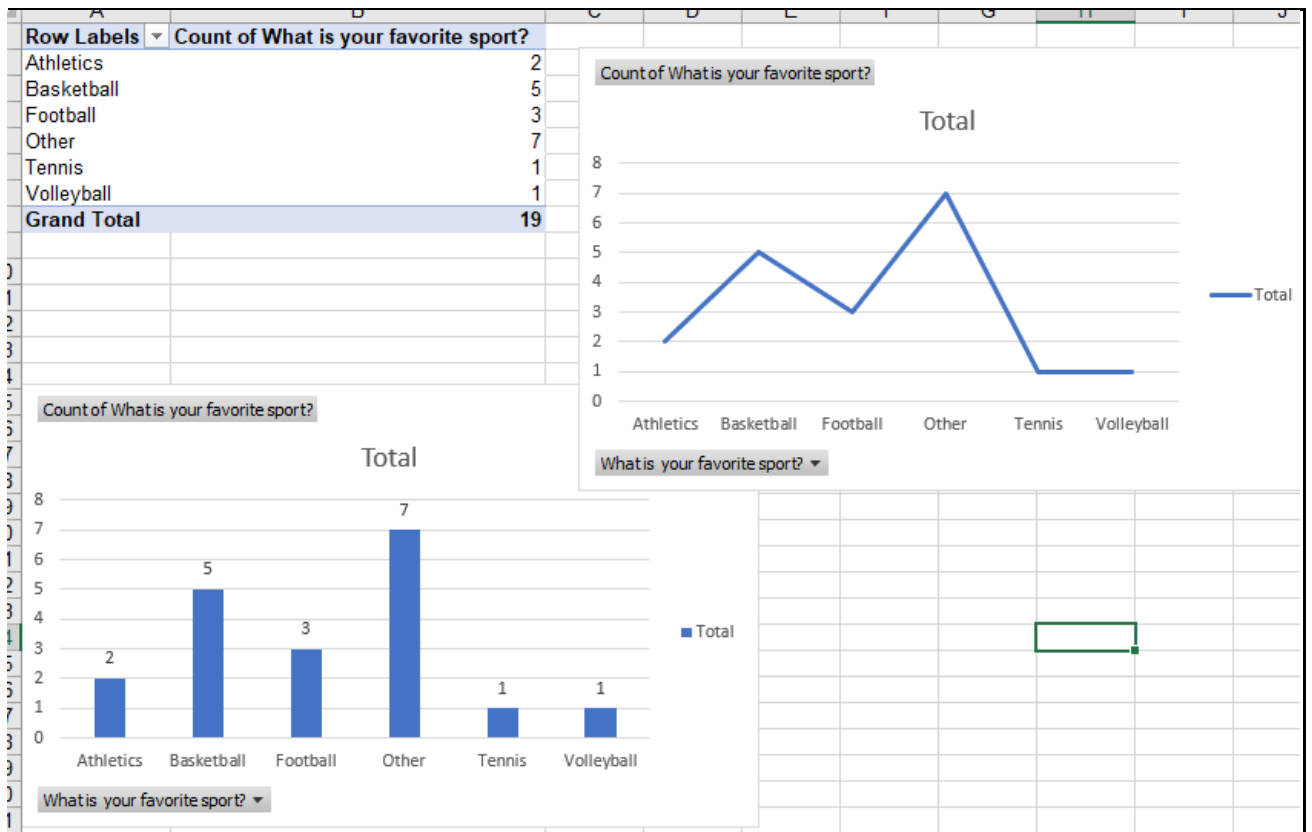3. Drag the label to the **Axis** and **Values** boxes.

4. Then, use the pivot chart to create different types of graphs



**2. Graph the rest of your ordinal and nominal** data using the mode

1. Create a pivot chart for the rest of your ordinal and nominal data.
2. Show the **pivot table** and **pivot chart**.

| Row Labels ▼ | Count of What is your favorite sport? |
|---|---|
| Athletics | 2 |
| Basketball | 5 |
| Football | 3 |
| Other | 7 |
| Tennis | 1 |
| Volleyball | 1 |
| **Grand Total** | **19** |

### 3. Graph the interval and ratio data
1. Use various types of graphs
2. Show the minimal, maximum, and mean (average value).
3. Add a chart representing the mode