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📅 Thu, 2/17 4:05PM 🕒 14:43

SUMMARY KEYWORDS

age, bond, prime ministers, calculate, median, third quartile, function, quartile range, excel, type, first quartile, equal, laurier, cell, quartile, payment, mode, prime minister, data, select

SPEAKERS

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Hello, and welcome. In this video, we're going to look at measures of central tendency, we're going to calculate the mean the mode and the median. We're going to look at how to do this in Excel, we're going to see, there might be some issues with the mode function and excel spoiler alert, and we're going to look at range and inter quartile range. And how it can we find these inner quartile points, given data set in Excel. Question two A is asking us to calculate the median, the mean and the mode age of the Prime Ministers of Canada. And there are functions that will allow us to do that, easily. If we look, we've got our prime ministers, the first thing we might want to do, although Well, let me show you how to calculate the median. So the function in Excel that will calculate the median for us is called median. And so I will type in equals median and the cell E 14. And then I'll create our type in an open parentheses, I want to select the data, the series of values from which we're dry. And those are the ages. And I'll close the parentheses and hit enter. And it says that the median age is 55. Now suppose we want to verify that by finding the median ourselves, there's a few ways we could do that. The first is we probably want to sort the Prime Ministers by their age instead of the the historical order in which their Prime Minister. To do that I'll highlight their ages, I'll go to the Home menu tab, I'll choose sort and filter and I want the ages to be sorted from smallest to largest. Excel has given me a warning about expanding the selection, I do want it to expand the selection. And this should allow the names to remain matched with the ages. And when I do that, we now have the youngest Prime Minister Joe Clark, all the way up to the oldest Prime Minister in history, tougher. Now one way to find the median or an easier way, or a way to help us find the median without using the Excel function would be to create an index. So Joe Clark was the first prime minister or the youngest Prime Minister, I should say, Justin Trudeau is the second youngest and so on. And I can highlight these numbers and then populate the cells below it. And we've got 23 Prime Ministers in Canada's history. The median value is going to be the value on which there are many observations less than that one as there are observations above it. And that's going to be Sir Wilfrid Laurier. At 55. We've got 11 observations above Laurier and 11 observations below Laurier or 11 people- 11 prime ministers who are older than Laurier and 11 prime ministers who are younger than Laurier, we could use the formula to calculate the mean. But we can just use the function in Excel, the function is actually average. Although this course taught you that the median, the mean and the mode are all averages, excels function to pull to calculate the mean is called average. And we're going to use average and we're going to select

the ages that we're interested in close parentheses, and F 5. Maybe change the format here, all right click on that cell format cells will make it a number with one decimal place, so it looks a little nicer. And we can see that we have a median age of 55, a mean age of 55.6. Of course, we could verify it if I click on this tab, I should say if I click on the cell, C 37. Press equal I'll type in sum for summation and then select all the ages. Close parentheses. And I'll go back to this sum. And then I could say equal to or I'll go to the cell below and I'll go to C 38. Hit the equal sign. I'm having trouble selecting but I'll just type in C 37. And I'll divided by the number of prime ministers which we have from the index which is 23. And we can see that the mean age of the Prime Minister is 55.56 or round it to 55.6 if we just have one decimal place. Similarly, the mode is a function in Excel called the mode. And we will just select, again, called mode, choose the values that we want Excel to look for the mode, or choose the cells of all the values in which we want Excel to search for the mode, press Enter. And it says that the mode is 46. And if we quickly look, if we quickly look at the data, there's a bit of a problem because yes, there are two prime ministers who are 46. There's also two who are 47, two who are 48, to 52, to 55, to 60. And so each of these values will be just as correct to say that they are the mode as well. And so here's a limitation. We found a limitation with excels mode function, it just returns one value, but there's actually more than one. And the next question is asking us to calculate the weighted average using the data that's on the sheet, labeled income. So if you look down here, we've got different sheets of data. And in order to quest-answer question 2b, we need to go to the income sheet. Information about a portfolio of bonds, there are different bond types or bond names. And we have HHS and CH, and so on, each bond pays a certain amount of money. For each one, it's got what will be called in finance a coupon payment, but you can just think of it as money that it pays out. And the portfolio has more than one of each type of bond. In fact, it has 4000 HHS bonds and has 2000 and CH bonds. And we're being asked to calculate the mean payment of a bond. So what's the average payout for the bonds in this portfolio? And to answer that question, we want to create a weighted average. And the weighted average, or the average, as you say, is going to be weighted by the value of the payments each bond makes. So to get started, let's calculate how much money comes from each type of bond. And to do that I'm on cell D 4, I press the equal button, choose the payment per bond per bond, I'm going to press Shift eight or star suffer multiplication and multiply the payment per bond \$25 by the cell C 5, which contains the number of bonds, and excels telling me that that's going to be, that the payments from HHS bonds is worth \$100,000, I can then use the formula that I have in cell D five and populate it into the other cells. If I then add cell D 10, I hit equal and some I can add up all the income from all the different types of bonds. And we find that all these bonds ended up paying \$236,800 How many bonds were there, while there was 4000 plus 2000 plus 500. So we can add up all the bonds of the number of bonds in the call and the C column. And if we want to know the mean, the weighted mean it's going to be equal to \$236,800 divided by the total number of bonds, which is 10,800. And the mean is going to be \$21.93. Now the second part of the question is asking us to calculate the proportion of income from each type or each bond type. And another way to phrase that is, what's the weight? How much weight or what proportion do you assign to each bond type how much of the total value is each bond type creating? And to do that, we can take the income from each type of bond and divided by the the total amount of income that's in cell D 10. And I want to do that for each type of bond, but I don't want the cell D tend to change. So I'm going to add dollar signs - a dollar sign in front of the D, a dollar sign in front of the 10, I hit enter. And then it says that per bond type HHS, that type of bond generates 42.2% Of all the income generated by the entire portfolio populate those that formula into the cells below E five, and I can find the proportion of income from each of the different types of bonds. Notice that if we sum up all the weights, they equalize 100%. That's just a way to make sure we didn't make a silly mistake. We're back on the sheet with the ages of the Prime Ministers. And our next question is number question number three, we want to calculate the range and the inter quartile range. So how can

we calculate the range? Well, the range is going to be equal to the highest age minus the youngest age. And so the range is just going to be equal to 35. It's equal to 75 years of age, minus 40 years of age. So the range is pretty straightforward. What about the inter quartile range, while we need some more information, remember, it's the difference between the third quartile and the first quartile, so we're going to need a third. Or maybe we'll type this out in full, we're going to need the third quartile, and we're going to need the first quartile. And we can use a function from Excel to help us. So I'm going to go equal quartile. And we could make it exclusive. And I'm going to click on this little function here quartile dot EXC, for exclusive what array, the array is the data that we're going to use, it's going to be the ages of the Prime Ministers. So I will highlight that. And we put in a comma to separate different pieces of information that the Excel function requires. And if we put in a one, that would give us the first quartile, but here we're interested in the third quartile. So we can see that there's little instruction here, that says puts in the number three, if you want the third quartiles, put in the number three. And it brings back the age of the prime minister, who is at the third quartile or the 75th percentile. And that age is 65. So we're looking at Paul Martin right here. Similarly, we're going to find the first quartile. So I hit equal quartile, make it exclusive. And we'll select the values, comma. This time we want the first quartile. So we'll put in the number one, and then close the parentheses so that Excel knows that the function commands are complete. And the first quartile the age is 47. So we're looking at Stephen Harper and Prime Minister Thompson. Now, how do we calculate the IQR? Well, it's got to be equal to 65 minus 47. And so the inter quartile range is 18 years of age, and quite a bit smaller than the full range together. What does this mean? Well, basically, it means that 50% Of all the prime ministers are included in this inter quartile range. And so the difference between those 50 Prime Ministers ages is the maximum of those ages minus the minimum is 18. And so, these are our first measures of dispersion or variability.