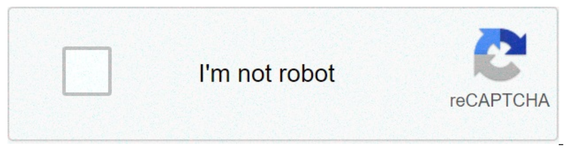

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What is the difference between continuous and discrete quantitative data give examples

Data may come from a population or from a sample. Small letters like x or y generally are used to represent data values. Most data can be put into the following categories: Quantitative Data Qualitative Data Definition Quantitative data are the result of counting or measuring attributes of a population. Qualitative data are the result of categorizing or describing attributes of a population. Data that you will see Quantitative data are always numbers. Qualitative data are generally described by words or letters. Examples Amount of money you have Height Weight Number of people living in your town Number of students who take statistics Hair color Blood type Ethnic group The car a person drives The street a person lives on Researchers often prefer to use quantitative data over qualitative data because it lends itself more easily to mathematical analysis. For example, it does not make sense to find an average hair color or blood type. Quantitative data may be either discrete or continuous. All data that are the result of counting are called quantitative discrete data. These data take on only certain numerical values. If you count the number of phone calls you receive for each day of the week, you might get values such as zero, one, two, or three. All data that are the result of measuring are quantitative continuous data assuming that we can measure accurately. Measuring angles in radians might result in such numbers as [latex]\displaystyle\frac{pi}{{6}},\frac{pi}{{3}},\frac{pi}{{2}},pi,\frac{{{3}pi}}{{4}}[/latex] , and so on. If you and your friends carry backpacks with books in them to school, the numbers of books in the backpacks are discrete data and the weights of the backpacks are continuous data. Example of Quantitative Discrete Data The data are the number of books students carry in their backpacks. You sample five students. Two students carry three books, one student carries four books, one student carries two books, and one student carries one book. The numbers of books (three, four, two, and one) are the quantitative discrete data. The data are the number of machines in a gym. You sample five gyms. One gym has 12 machines, one gym has 15 machines, one gym has ten machines, one gym has 22 machines, and the other gym has 20 machines. What type of data is this? Example of Quantitative Continuous Data The data are the weights of backpacks with books in them. You sample the same five students. The weights (in pounds) of their backpacks are 6.2, 7, 6.8, 9.1, 4.3. Notice that backpacks carrying three books can have different weights. Weights are quantitative continuous data because weights are measured. The data are the areas of lawns in square feet. You sample five houses. The areas of the lawns are 144 sq. feet, 160 sq. feet, 190 sq. feet, 180 sq. feet, and 210 sq. feet. What type of data is this? The data are the colors of backpacks. Again, you sample the same five students. One student has a red backpack, two students have black backpacks, one student has a green backpack, and one student has a gray backpack. The colors red, black, black, green, and gray are qualitative data. A statistics professor collects information about the classification of her students as freshmen, sophomores, juniors, or seniors. The data she collects are summarized in the pie chart. What type of data does this graph show? Example 1 Determine the correct data type (quantitative or qualitative). Indicate whether quantitative data are continuous or discrete. Hint: Data that are discrete often start with the words “the number of.” The number of pairs of shoes you own The type of car you drive The place where you go on vacation The distance it is from your home to the nearest grocery store The number of classes you take per school year. The tuition for your classes The type of calculator you use Movie ratings Political party preferences Weights of sumo wrestlers Amount of money (in dollars) won playing poker Number of correct answers on a quiz Peoples’ attitudes toward the government IQ scores Omitting Categories and Missing Data The table displays Ethnicity of Students but is missing the “Other/Unknown” category. This category contains people who did not feel they fit into any of the ethnicity categories or declined to respond. Notice that the frequencies do not add up to the total number of students. In this situation, create a bar graph and not a pie chart. Frequency Percent Asian 8,794 36.1% Black 1,412 5.8% Filipino 1,298 5.3% Hispanic 4,180 17.1% Native American 146 0.6% Pacific Islander 236 1.0% White 5,978 24.5% TOTAL 22,044 out of 24,382 90.4% out of 100% Figure 1. Ethnicity of Students The following graph is the same as the previous graph but the “Other/Unknown” percent (9.6%) has been included. The “Other/Unknown” category is large compared to some of the other categories (Native American, 0.6%, Pacific Islander 1.0%). This is important to know when we think about what the data are telling us. This particular bar graph in Figure 2 can be difficult to understand visually. Figure 2. Bar Graph with Other/Unknown Category The graph in Figure 3 is a Pareto chart. The Pareto chart has the bars sorted from largest to smallest and is easier to read and interpret. Figure 3. Pareto Chart with Bars Sorted by Size The difference between discrete and continuous variables is that the former relates to a specific and often simplistic number, the value of which has been obtained purely through counting, whereas the latter is a progressive, changing number that is instead measured over time and is often complex. It’s certainly a daunting thought to consider that you could step into a statistics class and the first question you may be asked to answer is, what is the difference between discrete and continuous variables? If you’ve never heard the terms before, this is sure to lead to immediate confusion. Luckily for you, we’re going to provide you with plenty of examples to help you differentiate them as well as a continuous and discrete data definition to make their areas of differentiation as clear as possible. We’ve left no stone unturned in the pursuit of providing you with total clarity before you head back into the classroom or office. Definition of Discrete – What Does Discrete Mean? The exact definition of discrete variable is: “A discrete variable relates to any number that can be obtained purely through counting and has a very precise and specific end value.” The mention of the word “counting” in the description above is the enormous deciding factor when it comes to determining what kind of variable you’re looking at. You don’t count when you’re analyzing continuous metrics because they’re infinite and don’t have a start or end point. It’s impossible to summarize their quantity until you stop measuring them. In other words, they’re a number that you can’t definitively count, as strange as that might seem. On balance, discrete data values do have a start and end point. There’s always a minimum and maximum whereas there’s no such thing with continuous metrics. They can quite literally go on forever. This is a major difference between discrete and continuous data because when the variable values are finite and have a predetermined value, they cannot possibly be categorized as continuous. They have a precise end value and a precise start value. The word “counting” in and of itself implies that there is a set value in the first place. For you to fully understand what separates discrete vs continuous satisfactorily, you must first get to understand the innate characteristics of the discrete vs continuous variables from a numeric perspective so that regardless of whether you’re asked to describe discrete or continuous, you’ll know exactly where you stand. For a start, one must describe what a variable is before you even think of discerning the difference between discrete and continuous. A variable is any data item whose value keeps on changing but can be measured. It can also be described as something that isn’t confined to a fixed pattern and may change. A major variation between a discrete vs continuous variable can be found in the nature of the data being measured with each. Technically speaking, though the number being counted with a discrete variable can be different depending on the quantity of whatever it is that you’re counting, a discrete variable isn’t variable at all. This is because the number being counted is specific. The variable aspect here is merely the quantity being counted from instance to instance. As we previously mentioned, it has a finite (definite and conclusive) value. This is what sets it apart from a continuous metric which is completely open-ended. When comparing a discrete vs continuous variable, it’s vital to remember that the continuous variable is the exact opposite of discrete because it has a value that keeps changing. What makes it difficult to measure is the fact that it can take on an infinite number of values at any given moment. Its value isn’t fixed, whereas a discrete value is. One is dynamic (continuous), whereas the other is static (still and unchanging.) Definition of Continuous – What Does Continuous Mean? The definition of continuous variable is: “A discrete variable relates to any number or metric that progressively changes and can take on any value.” It’s this infinite or unlimited number of values capacity that gives us the underpinning variation between discrete vs continuous statistical data. You’ll know whether you’re dealing with a value that is discrete or continuous by whether or not it has a definitive “end” point. An example that can help us to separate discrete vs continuous variables would be a tally chart based on gathered data. The final values presented in each section of the tally chart would define discrete variable parameters because they would be based on very specific numbers and counting and have conclusive final values. We could also observe discrete parameters in action when counting a stack of plates. Because there is a ‘first’ plate and a ‘last’ plate, this means that the numerical information being gathered can’t be continuous because it doesn’t change. The size of the plate stack would always remain constant regardless of how many plates were in it. On balance, we would see the difference between discrete and continuous variables easily when observing a standard bank account. This is because the values being presented in a bank account constantly change and therefore cannot be categorized as discrete data. Another great example is an Excel spreadsheet, or any live spreadsheet collecting numerical data. When you’re using a system like this, you’re constantly updating the sheet with information that can completely vary in nature. This makes it undeniably continuous in nature. Interestingly, a spreadsheet can also revolve around discrete variable principles, too. This occurs when you’re entering set numbers into the different sections that then combine together to form a whole. The reason why a spreadsheet would be classified as discrete under these circumstances is because all of the data being gathered falls within one overriding set quantity. If you’re entering live numerical information onto a spreadsheet, then the moment that you click the save button, this would also technically convert the spreadsheet from being a continuous form of data to being a discrete form of data. This is because the numerical values contained on the sheet are no longer changing and have now been given a specific start and end point. They’ve gone from being ‘open’ numbers to being ‘closed’ and therefore confined. All of these forms of value collection serve as excellent discrete vs continuous examples that we can draw on in the real world to help us set discrete and continuous variables apart from one another. Having defined discrete vs continuous in simplified manners along with their separate definitions and some useful practical examples, you are now ready to look into greater detail at what sets discrete vs continuous data apart by reviewing the difference between discrete and continuous in our quick reference table. What Is Main the Difference Between Continuous and Discrete Variables? Below we’ve laid out some super easy to understand examples of discrete vs continuous data that serve to conclusively separate discrete and continuous variables apart from one another. Basis of ComparisonDiscrete Variable Continuous Variable Meaning A variable with a limited number of values which are isolated Is characterized by variables with unlimited number of ranging values Values Countable Measurable Range of specified number Complete or whole Incomplete Represented by Lone points on a graph Linked points Classification Do not overlap Overlapping Assumes Separate or distinct value A value between a range Real world examplesThe number of pebbles in a jar, the number of shoes in a wardrobe, the number of people in a roomA bank account, a live spreadsheet, the number of people coming in and out of a building in real time, an ECG monitor To make things even easier for you, we’ve also created an FAQ that explores the most commonly asked questions about discrete and continuous variable types so that you can easily cast a quick glance over it any time you need to refresh yourself on the difference between continuous vs discrete variable types. Discrete and Continuous Variable Difference – FAQ Below are outlined the most common queries about discrete and continuous variables by people just like you who are trying to gain a better understanding of them: What’s the difference between discrete and continuous counting? Discrete counting means that the value of the data you’re collecting has a definitive end point and final value number. Continuous counting means that there is no definite end point or value and the counting could go on forever. What do the words “continuous” and “discrete” mean when you’re comparing continuous vs discrete variable data? Continuous means “forming an unbroken whole” whereas discrete means “individually separate and distinct.” This reflects both the potentially never ending and respectively conclusive natures of the data gathered using discrete vs continuous variables. How do you know if something is a continuous vs discrete variable? It’s relatively easy to discern the variables between discrete vs continuous data because one type (discrete) focuses on the act of counting a set quantity of something, whereas the other (continuous) revolves around measuring a nonspecific and changing value. What are some discrete vs continuous examples that can help me to understand them better? Some examples of discrete values would be the value of a stack of coins, the number of biscuits in a tin, or the number of stones in a jar. These values are all discrete because they are made out of a set number that doesn’t alter. Some great continuous examples would be a bank account, a live spreadsheet containing numerical data, and an ECG monitor. What makes these examples continuous is the fact that the numerical data being measured has no set value and can change from one second to the next. So What Is Discrete and Continuous Variable? – Conclusion By now, you finally know what a statistical variable entails and how to differentiate continuous vs discrete variables from one another effectively. Whenever you are asked to summarize discrete and continuous variables, think about their most distinguishing features. Just remember that the discrete vs continuous examples highlight their key summary features quite well. For the discrete variable, we know that its specific and conclusive nature distinguishes it while for the continuous variable we know that it can take on infinite values. These features form the basis for the underlying principles of the statistics of continuous and discrete variables.

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