

Chapter 1

What Is Statistics?

9.
 - a. Ordinal
 - b. Ratio
 - c. The newer system provided information on the distance between exits. **(LO1-5)**
10. The cell phone provider is nominal level data. The minutes used are ratio level. Satisfaction is ordinal level. **(LO1-5)**
11.
 - a. The ranking of wearable technologies would most likely be based on a population. All possible brands and models could be listed.
 - b. Since the ratings are self-reported, it is very likely that not all users submitted a rating. Therefore, the ratings are a sample or a subset of the population. **(LO1-3)**
12. In a presidential election all votes are counted, thus it is similar to a census of the entire population. However, an “exit” poll consists of only some voters and thus is more like a sample of the entire population. **(LO1-3)**

13.

	Discrete	Continuous
Qualitative	b. Country d. Energy drink preference g. Student rank in class h. Rating of a finance professor	
Quantitative	c. Sales volume of treadmills f. SAT scores i. Number of home video devices	a. Salary e. Temperature

	Discrete	Continuous
Nominal	b. Country	
Ordinal	d. Energy drink preference g. Student rank in class h. Rating of a finance professor	
Interval	f. SAT scores	e. Temperature
Ratio	c. Sales volume of treadmills. i. Number of home video devices	a. Salary

(LO1-4 and LO1-5)

14. Answers will vary. **(LO1-5)**

15. As a result of these sample findings, we can conclude that 120/300 or 40% of the white-collar workers would transfer outside the U.S. **(LO1-3)**

16. The obvious majority of consumers (400/500, or 80%) believe the policy is fair. On the strength of these findings, we can anticipate a similar proportion of all customers to feel the same. **(LO1-3)**

17. a. Based on the differences, 22 of the 38 brands increased sales from 2020 to 2021.

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Brand	Diff
Honda	108,671
Hyundai	106,790
Kia	91,489
Nissan	81,328
Toyota	69,423
BMW	56,397
Lexus	51,886
Mazda	49,161
Genesis	33,246
Ram	22,692
Acura	20,426
Buick	19,631
Mitsubishi	14,649
Volvo	13,294
Porsche	11,889
Volkswagen	10,778
Land Rover	9,745
Tesla	9,096
Audi	8,217
Mini	7,121
Mercedes-Benz	4,957
Chrysler	4,717
Alfa Romeo	(333)
Fiat	(1,930)
Jaguar	(4,637)
Cadillac	(11,501)
Subaru	(13,458)
GMC	(14,613)
Lincoln	(17,476)
Infiniti	(20,948)
Jeep	(26,593)
Dodge	(51,600)
Ford	(124,402)
Chevrolet	(261,144)

- b. This analysis shows that the top five brands in percentage increases from 2020 to 2021 were Genesis, Mini, Porsche, BMW, and Lexus. Lincoln, Dodge, Jaguar, Infiniti, and Fiat were in the bottom five reporting negative percentage increases from 2020 to 2021.

Brand	% change from 2020
Genesis	203%
Mini	25%
Porsche	21%
BMW	20%
Lexus	19%
Mazda	18%
Hyundai	17%
Mitsubishi	17%
Kia	16%
Acura	15%
Land Rover	12%
Volvo	12%
Buick	12%
Nissan	10%
Honda	9%
Audi	4%
Chrysler	4%
Toyota	4%
Ram	4%
Tesla	3%
Volkswagen	3%
Mercedes-Benz	2%
Alfa Romeo	-2%
Subaru	-2%
GMC	-3%
Jeep	-3%
Ford	-6%
Cadillac	-9%
Chevrolet	-15%
Lincoln	-17%
Dodge	-19%
Jaguar	-21%
Infiniti	-26%
Fiat	-45%

c. These graphs help to show the comparison in sales and percent change in sales for 2020 and 2021. In general, the top ten companies showed both increases and decreases in sales. These differences are very apparent in the chart of percentage change. While Ford and Chevrolet sold over a million cars, both showed reduced sales compared to 2020. Hyundai and Kia showed the highest percent increase in sales among the top ten in total sales.



(LO1-2)

18. The total amount spent is \$603.86. The percents by group are: 75, 14, 4, and 7, respectively. **(LO1-2)**

19. The graph shows variation in earnings over the years. Based on the history of the economy, earnings may have increased during 2009-2012 as the economy recovered from the “Great Recession”. Also, the variability of earnings from 2013 to 2017 may be related to increases in supply and decreases in demand for oil. Supply may have increased with new production in North Dakota. Demand may have been affected by other sources of energy, such as wind and solar energy generation. Also, the use of natural gas to generate energy may be substituting for oil. In 2020, the earnings were most likely affected by the global COVID pandemic. **(LO1-2)**

20. a. Qualitative variables: Pool, Garage, Township, Mortgage type, Default
Quantitative variables: Price, Bedrooms, Size, Baths, FICO Years **(LO1-4)**

b. Price measured in dollars: Continuous, Ratio scale
Agent: Nominal
Bedrooms are counted: Discrete, Ordinal??? Ratio scale
Size measured in area of square feet: Contiguous, Ratio scale
Pool measured as present or not: nominal
Garage measured as present or not: nominal
Baths are counted: Discrete, Ordinal?? Ratio scale
Township is labeled: nominal
Mortgage type measures as adjustable or fixed: nominal
FICO is an index of a person’s ability to pay their bills: ratio
Years are counted: ordinal
Default: measured as yes or no: nominal **(LO1-5)**

21. a. League is a qualitative variable; the others are quantitative. **(LO1-4)**

b. League is a nominal level variable; the others are ratio level variables. **(LO1-5)**

22. a. Bus Number, Manufacturer, and engine type are qualitative variables, the others are quantitative. **(LO1-4)**

b. Bus Number, Manufacturer, and Engine Type nominal level variables; the others are ratio level variables. **(LO1-5)**