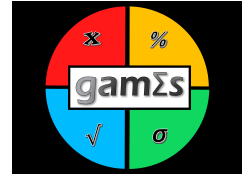


# GAMES Practice Problems – Descriptive Statistics: Averages and Variability



- An accountant is adding the salaries of employees that work for the City of Burnaby. He accidently adds an extra zero to the end of the salary of a manager who is earning \$200,000. How would this mistake affect the following summary statistics:
  - The mean
  - The median and mode
  - Range and IQR
  - Standard deviation and variance
- A union and business are negotiating a new contract. The union representative states that the annual average days absent per employee is 4. The business representative argues the average number of days absent is 6. Can both be correct? Explain
- Create a stem-and-leaf plot of the ages for a conservative party's members. The ages are: 50, 21, 25, 61, 75, 41, 76, 33, 93, 62, 66, 62, 49, 45, 52, 81, 49, 63, 76, 79, 57, 80, 81, 93, 60. These can be found in the file "GAMES-DescriptiveStats-Excel-PracticeProblems-Data.xlsx" file.
- A political party has statistics for its volunteers. Amy volunteered 60 hours a week; George volunteered 50 hours a week; Agatha volunteered 40 hours a week; six volunteers volunteered 20 hours and four others volunteered 10 hours a week.
  - Find the mean and median number of volunteer hours.
  - How many volunteers volunteered more than the mean amount?
  - Which measure of centre best describes the typical volunteer for this political party?
  - Which measure of dispersion would best capture the volunteer hours? The range, the IQR or the standard deviation? Why?
- Below is data on the aboriginal/indigenous population of metropolitan areas in Ontario

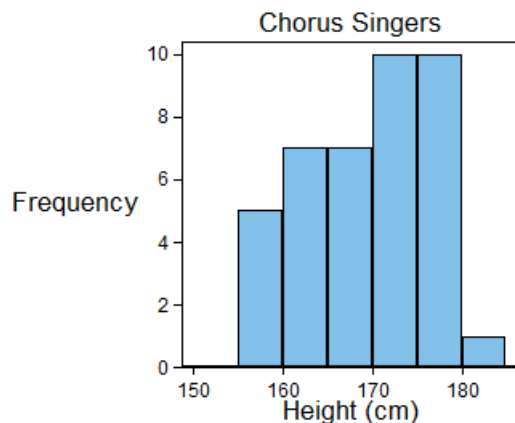
Metropolitan Area	Population (2016)
Toronto	46,315
Ottawa-Gatineau	38,115
Greater Sudbury	15,695
Thunder Bay	15,075
Hamilton	14,445
London	12,070
St. Catherines - Niagara	11,640
Sault Ste. Marie	9,545
Oshawa	8,965
Kitchener - Cambridge - Waterloo	8,885

<https://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-PR-Eng.cfm?TOPIC=9&LANG=Eng&GK=PR&GC=35>

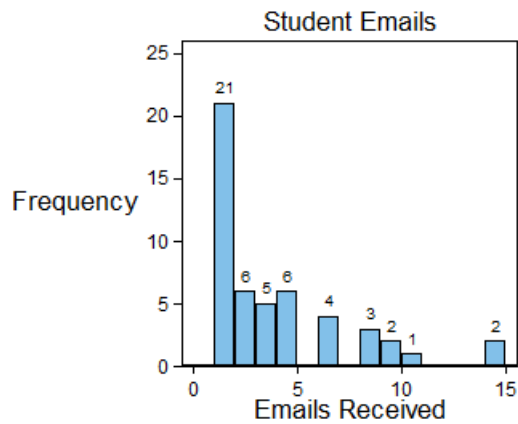
The data can also be found in the "GAMES-DescriptiveStats-Excel-PracticeProblems-Data.xlsx" file on sheet "Aboriginal".

- If there were 374,395 people with aboriginal identity in Ontario, what percentage lived in the 10 cities reported?

- (b) Calculate the mean, median, range, IQR and sample standard deviation.
- (c) If the indigenous populations of Toronto and Ottawa-Gatineau were recorded as 16,000, would any of the five descriptive statistics calculated in part 5b change?
6. In the spreadsheet “GAMES-DescriptiveStats-Excel-PracticeProblems-Data.xlsx, sheet: Carbon emissions”, calculate the mean, range, and standard deviation of world, North American, African, and European carbon emissions from 1950-2014. Compare each series to global emissions per person and discuss your result.
7. Canadian hockey player Sidney Crosby scored the following number of goals in each of his first 17 seasons: 39. 36. 24. 33. 51. 32. 8. 15. 36. 28, 36, 44, 29, 35, 16, 24, 15.
- (a) Would you use the median or mean to describe the center of this distribution? Why?
- (b) Calculate the median.
- (c) Without calculating, would you guess that the median would be higher or lower or about the same as the mean?
8. The following histogram contains information about the height of members of a chorus. The organizer needs to know the height of the singers to arrange the taller singers in the back row and the shortest in the front row.

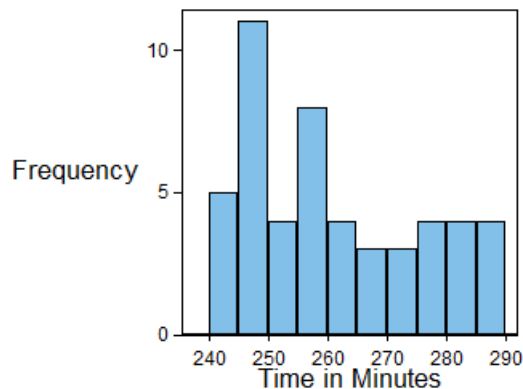


- (a) What is the width of one bin size?
- (b) How many chorus centers are included on the histogram?
- (c) What proportion of chorus singers are above 170 cm in height?
- (d) What proportion of singers are less than 155 cm in height?
9. The following histogram contains information about the number of emails received by a professor during a semester. For each student to send her an email, she counted how many emails that student sent.



- (a) Judging from the histogram, would you expect the mean or median to be larger? Explain.
- (b) What is the median number of emails?

10. Consider the following graph with information on the time it took runners to complete a marathon.



Explain how the following changes impact the mean, median, range, IQ, and standard deviation for the following events:

- (a) Change the times above 280 to 280.
- (b) Add 10 new runtimes between 270 and 280.
- (c) Add 10 observations 20 minutes above the mean and add 10 observations three minutes below the mean.
- (d) Subtract 2 minutes from each time.



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