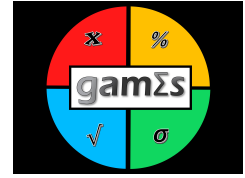


GAMES Practice Problem Solutions – Descriptive Statistics: Averages and Variability



1. (a) The mean would be higher than it actually is. Most public sector employees would likely be making less than \$200,000 per year – let alone \$2 million a year. The mean would likely increase quite a bit especially if the number of employees working for the city were small. The mean would be biased upwards.
- (b) The median and mode are unlikely to be impacted Assuming that \$200,000 a year was probably already above the median
- (c) The range would be affected if \$2 million were the highest salary among employees for the City of Burnaby.
- (d) Both the standard deviation and variance are susceptible to extremely large and extremely small values. These statistics would be biased upwards.
2. There are three ways to calculate an average: the median, the mode, and the mean. If a small number of employees have a high number of days absent, the mean is expected to be larger than the median. Under that assumption, it's likely that the median days absent is 4 while the mean days absent is 6.
3. "GAMES-DescriptiveStats-Excel-PracticeProblems-Data.xlsx"
4. (a) mean is 23.85, median is 20.0
- (b) 3
- (c) median is likely more representative as George, Agatha, and Amy were more active than the others.
- (d) The IQR could be best as it ignores large hours volunteered from George, Agatha, and Amy1.
5. (a) 48.3 %
- (b) mean: 18075, median: 13257.5, Range: 37430 IQR: 6150, σ : 13100.6
- (c) The mean, range, and standard deviation would become smaller while the median and IQR would remain the same.

6.

Variable	Mean	Std. Dev.	Range
Global	1.07	0.18	1.35
Namerica	4.88	0.52	1.94
Europe	1.88	0.32	1.22
Africa	0.24	0.07	0.23

North American carbon emissions per person were much higher than that of Europe – more than double. European emissions per person were on-average above the global per-person amount. African carbon emissions per person is far below the global mean. In absolute terms, the variability in global, North American, and European carbon emissions per-person were similar according to the range. Africa Hhad lower absolute variability due to its low mean.

7. (a) The median might be a better choice. There are some smaller values that might bias the mean downwards.

- (b) 32
- (c) The median would be a little bit higher because in some seasons Sidney Crosby did not play a full 82 game season. These injuries are reflected in fewer goals scored.
8. (a) 5 centimeters
- (b) 40
- (c) $21/40 = 52.5\%$
- (d) $12/40 = 30\%$
9. (a) Most students who sent an email sent only one, but a small number of students sent many emails. We say this distribution is skewed to the right. We would expect these large values to increase the value of the mean relative to the median.
- (b) 2
10. (a) The mean and the standard deviation would be smaller because the distribution has been truncated. The range would also be smaller. However the median would stay the same. With respect to the IQR, only eight observations were impacted and there are 50 observations in total, the IQR would remain the same. Since it is determined by the 37 or 38 observation and the 12 or 13 observation.
- (b) The observations added would be above the mean and median. This could change the median, mean. The standard deviation might decrease a little as there are more observations in the middle of the distribution. The IQR might change a small amount or not at all – it would be difficult to judge. The range will stay the same.
- (c) Adding the observations above and below the mean won't change the mean or range. The median (257) will be unaffected since the same number of observations were added above and below the mean. Since the observations are far from the mean, we would expect the standard deviation and IQ to increase.
- (d) The center of the distribution shifts two minutes to the left (down). So, the mean and the median decrease by two. The variability would be unaffected. So, the standard deviation, range, and the IQR would remain the same.



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