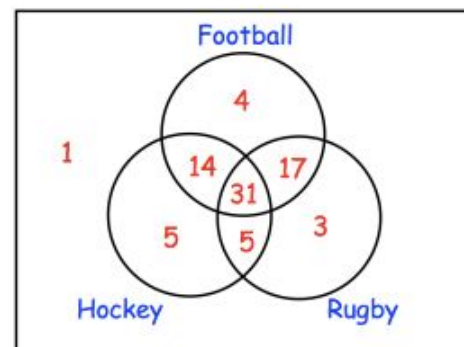


IM2 Problem Set 3.4 - Using Stats and Probability

BIG PICTURE of this UNIT:	• How do we analyze and then make conclusions from a data set? Or from a scenario in which probabilities are being considered? • How do I visually present my data and the outcomes of my analysis? How can we visualize events and outcomes when considering probability events? • How do I use data & statistics & probabilities to make decisions? • How do I decide on the validity/reliability of my data? Of my analysis? Of my conclusions? Of my decision?
---------------------------	---

1. Find the mean, median and mode of these data set:
 - a. 7,13,18,24,3,9,18
 - b. 24,15,18,20,18,22,24,26,18,26,24
2. The average weight of 11 players on a basketball team is 80.3 kg. A new player joins the team and the average weight on the team goes up to 81.2 kg. Find the weight of the new player.

3. Jennifer asked 80 people which sports they enjoy from Football, Hockey and Rugby.
 - a. How many people enjoy all three sports?
 - b. How many people enjoy football and hockey but not rugby?
 - c. How many people enjoy football and rugby but not hockey?
 - d. Which sport is enjoyed by the most number of people?
 - e. How probable is it that a randomly selected person enjoys rugby and hockey but not football?
 - f. Determine $P(\text{Football})$.



4. The chart to the right represents the distribution of salaries at a local company.
 - a. Calculate the median and modal salary interval.
 - b. Calculate the mean salary.
 - c. Prepare a frequency histogram of the salaries.
 - d. Hence, prepare a frequency polygon of the salaries.
 - e. How probable is it that a randomly selected employee makes more than \$30,000?

Salary (\$)	Number of Employees
18 000–20 999	4
21 000–23 999	16
24 000–26 999	14
27 000–29 999	7
30 000–32 999	3
33 000–35 999	0
36 000–38 999	0
39 000–41 999	0
42 000–44 999	2
45 000–47 999	0
48 000–50 999	1

5. Compare the following 2 classes:

Central Tendencies: Results Summary from Class A	Central Tendencies: Results Summary from Class B
— Mean grade $\Rightarrow$ 63% — Median grade $\Rightarrow$ 60% — Modal Grade $\Rightarrow$ 60%, 63%	— Mean grade $\Rightarrow$ 63% — Median grade $\Rightarrow$ 60% — Modal Grade $\Rightarrow$ 60%
Can we determine which class did “better” if all we know are the central tendencies?	

How about now?

Central Tendencies: Results Summary from Class A	Central Tendencies: Results Summary from Class B
— Mean grade $\Rightarrow$ 63% — Median grade $\Rightarrow$ 60% — Modal Grade $\Rightarrow$ 60%, 63% — Range $\Rightarrow$ 70%	— Mean grade $\Rightarrow$ 63% — Median grade $\Rightarrow$ 60% — Modal Grade $\Rightarrow$ 60% — Range $\Rightarrow$ 40%
Can we determine which class did “better” after we have now added the range to the central tendencies?	

6. Class Example #1 – Analyzing Quiz Scores $\Rightarrow$ 5 Number Summary

Here are QUIZ results from BOYS in our IM2 classes. The scores have already been sorted/ordered.

Here are QUIZ results from GIRLS in our IM2 classes. The scores have already been sorted/ordered.

3, 3, 3, 3, 4, 4, 4, 5, 6, 6, 7, 7, 8, 8, 8, 8, 8, 9, 9, 9, 9, 10, 10

4, 4, 5, 5, 5, 6, 6, 6, 7, 8, 8, 8, 9, 9, 9, 9, 9, 9, 10, 10, 10, 10, 10

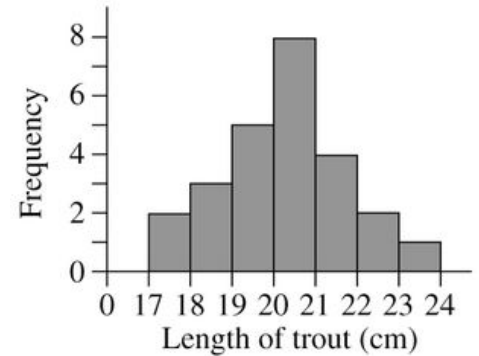
- (a) Determine the minimum score
- (b) Determine the maximum score
- (c) Calculate the range of the scores
- (d) Determine the lower quartile score
- (e) Determine the median score
- (f) Determine the upper quartile score

- (a) Determine the minimum score
- (b) Determine the maximum score
- (c) Calculate the range of the scores
- (d) Determine the lower quartile score
- (e) Determine the median score
- (f) Determine the upper quartile score

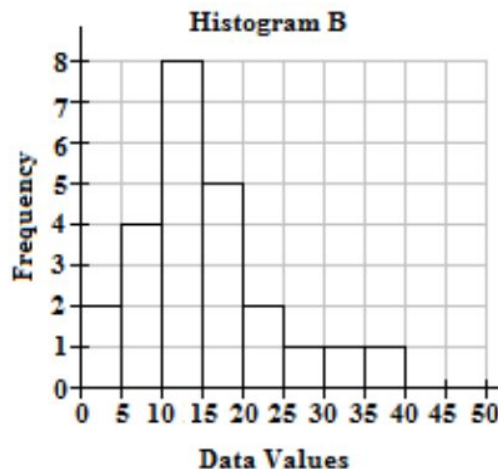
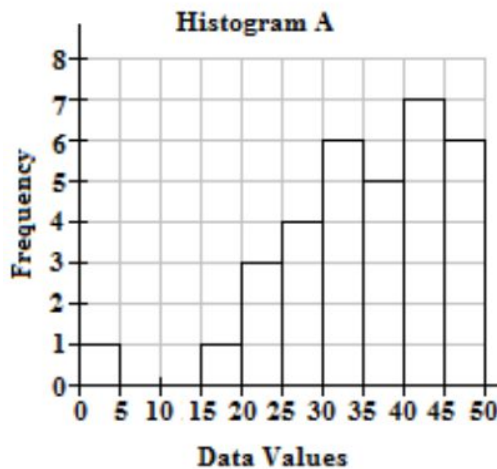
What observations & conclusions can we make from looking at the results of the data calculations?

7. The following data give the lengths in centimetres of 25 red finned trout living in Lake Eildon in Victoria.

- Determine the mean, median and mode.
- Is the data set skewed?
- How probable is it that a fish in the lake has a length:
 - Between 21 cm and 22 cm?
 - Between 18 cm and 21 cm?
 - Estimate the length of a fish whose length is in the lower quartile.



8. Here are two histograms showing the number of spectators at CAC sporting events; Histogram A shows student attendance at football matches and Histogram B shows attendance at volleyball matches.



- Which distribution had collected more data? Show/explain your reasoning.
- Which distribution has a larger range? Show or explain your reasoning.
- Determine the average number of students attending football matches and the average number of students attending volleyball matches.
- Which distribution is more likely to have a shape described as “skewed right?”
- Which distribution is more likely to have a higher median than mean? Explain why this would happen.

9. Use the **cumulative frequency table** below to answer the following questions about Mr Clauzet’s French class.

- How many students are in the class?
- How many students received a test score between a 70 - 79?
- How many students received a test score between a 60 - 69?
- Prepare a frequency histogram of the data set.

Scores on a French Test

Interval	Cumulative Frequency
50-99	30
50-89	24
50-79	12
50-69	12
50-59	2

10. A football team has a 70% chance of winning when it does not snow, but only a 40% chance of winning when it does snow. Suppose there is a 50% chance of snow. Complete this tree diagram to find the probability that the team will win.



11. Here are some simple coin tossing probability questions. Determine how probable it is that you:

- toss heads on one flip of a coin.
- toss heads or tails on one flip of a coin.
- toss 3 heads on three flips of a coin.
- toss 2 heads on three flips of a coin.
- toss at least 2 heads on three flips of a coin.

12. In a class of 24 students 12 students play the piano, 13 students play the guitar and 4 students play neither instrument.
- Represent this information on a Venn diagram.
 - A student is selected at random. Work out the probability that the student only plays the guitar.

13. This summary data has been collected on times taken, in minutes, to run 5 km in two different fun runs in Victoria Park.

- Draw box plots for both runs using the same scale
- Write down two comparisons between the races
- Emma says that Race 1 attracted more serious runners. Use your box plots to comment on what Emma has said

Run 1	
Median	35
Minimum	23
Range	40
Interquartile range	12
Upper Quartile	42

Run 2	
Median	36
Maximum	55
Range	30
Interquartile range	15
Lower Quartile	29

14. Odd Dice

Odd Dice

Age 14 to 16 Short ★★

Three fair, six-sided dice are numbered as follows:

A: 1, 1, 1, 2, 2, 2

B: 3, 3, 4, 4, 5, 5

C: 6, 7, 7, 8, 8, 8

The three dice are rolled once. What is the probability that the sum obtained is an odd number?

15. Draw a Venn diagram showing the two events A and B. Shade the following regions

1) $A \cap B'$

2) $A' \cap B'$

3) $A' \cup B$

4) $A \cup B'$

5) $(A \cap B)'$

6) $(A \cap B')'$

7) $(A' \cup B)'$

8) $(A \cup B')'$

9) $A' \cup B'$

\\