

IM2 Problem Set 3.3 - Using Stats and Probability

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> • 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?
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1. You have 3 data sets of sprinters and are being presented with the task of making a decision as to which two sprinters deserve to be selected for the CAC ISSA team. The event in question is the 400m sprint.
 - a. From your group's thinking about the graphs, you will record:
 - i. Initial thoughts that arise from the data sets and the context
 - ii. Initial conclusions that arise from the data sets and the context
 - iii. Initial questions that arise from the data sets and the context
 - b. Rotate one spokesman to another group and share thoughts, conclusions, questions. Use post-it notes to add new ideas. Then, let's consolidate as a class on ideas

Sprinter #1	57.54	55.23	59.32	58.42	58.21	56.37	57.41	56.10
	53.11	55.42	57.31	58.46	57.19	55.16	54.12	56.25

Sprinter #2	54.26	55.71	54.70	53.89	56.25	54.68	53.19	53.82
	57.29	55.54	54.96	53.87	55.21	53.32	54.10	53.61

Sprinter #3	55.49	53.15	54.64	55.91	57.80	54.48	53.93	55.12
	57.91	58.13	52.95	52.62	53.10	54.54	58.04	56.81

Part 2 - Application Problems with Statistics and Probability

1. The table shows the weights of boxes received at Greco's Coffee Shop.

- Estimate the mean weight of the boxes.
- Determine the modal interval of weights of boxes.
- Prepare a frequency histogram for this data set.
- How probable is it that the next box coming into Greco's has a weight between 4 - 8 kg?

Weight of box (w kg)	Frequency
$0 < w \leq 4$	11
$4 < w \leq 8$	16
$8 < w \leq 12$	29
$12 < w \leq 16$	26
$16 < w \leq 20$	20

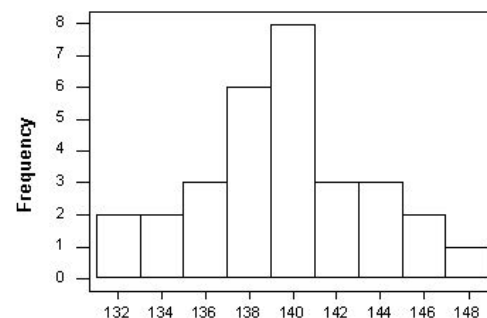
2. Calculate an estimate for the mean weight for students in our IM2 classes.

- Determine the modal interval of the weight of a "typical" IM32 student in our CAC classes.
- Estimate the mean weight of the students.
- Prepare a frequency histogram of the data set
- How probable is it that an IM2 student weighs between 60 - 80 kg?
- How probable is it that an IM2 student weighs at most 70 kg?
- Determine $P(50 < x \leq 80)$

Weight, w , Kg	Frequency
$40 < w \leq 50$	2
$50 < w \leq 60$	15
$60 < w \leq 70$	18
$70 < w \leq 80$	10
$80 < w \leq 90$	2

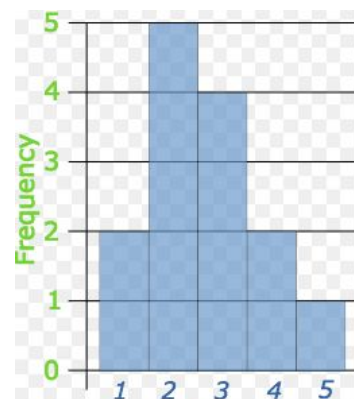
3. Here is a frequency histogram showing the weights of the members of the CAC wrestling team.

- Prepare a frequency table from the graph.
- Determine the mean, median and mode of the data set.
- Determine the interquartile range of the data set.
- Prepare a box and whisker plot.



4. Mr. S. keeps track of his students homework completion for his IM2 class. He collects the data for 5 consecutive classes and counts the number of HW COMPLETIONS and then records these scores in Skyward. So on the histogram shown, the x -axis is the number of HW completions by students in his class in the 5 lessons between Nov 17 and Nov 21.

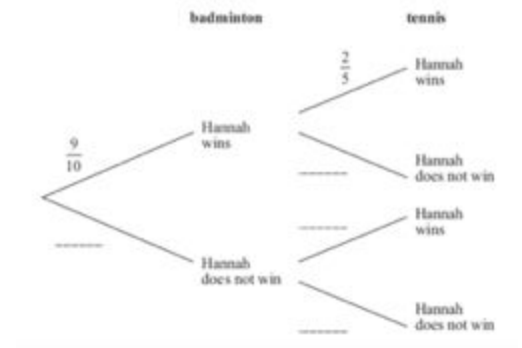
- Determine the mean of this data set.
- How probable is it that a randomly selected student has 1 homework incomplection?



5. Consider the event of rolling two six-sided number cubes with the numbers 1 through 6 placed one number on each side. How many arrangements are possible if you were to roll both dice? (For example: 1 and 2; 2 and 1 are two unique arrangements). Support your answer using words, numbers and/or diagrams.
6. Given your work in Question 5, determine:
- the probability that you roll a total of 8 on one roll of 2 dice.
 - the probability that you roll a total of 18 on one roll of 2 dice.
 - the probability that you roll a total that is a prime number on one roll of two dice.
 - the probability that you roll a total that is prime or a multiple of 5 on one roll of the 2 dice.
 - the probability that you roll a total that is prime and a multiple of 5 on one roll of the 2 dice.
 - $P(7 \leq x < 10)$
7. The 9 students in my F block class scored an average of 72% on the last test, while the 18 students in my A block class scored an average of 82% on the same test. What was the average test score from all the students in those 2 classes?

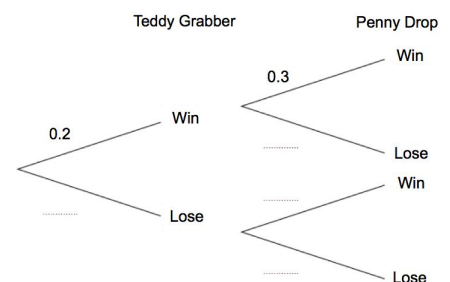
8. Hannah is going to play one badminton match and one tennis match. The probability that she will win the badminton match is $\frac{9}{10}$. The probability that she will win the tennis match is $\frac{2}{5}$.

- Complete the probability tree diagram.
- What is the probability that Hannah will win both matches?
- What is the probability that Hannah loses one match?
- What is the probability that Hannah loses at least one match?



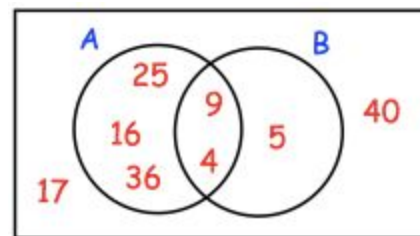
9. James goes to an arcade. He has one attempt in the Teddy Grabber game. He has one attempt in the Penny Drop game. The probability that he wins on the Teddy Grabber is 0.2. The probability that he wins on the Penny Drop is 0.3.

- Complete the tree diagram.
- How probable is it that he wins both games?
- How probable is it that he wins one game?
- How probable is it that he loses both games?



10. Here is a Venn diagram. Write down the numbers that are in

- the set of $A \cap B$
- the set of $A \cup B$
- the set of A'



One of the numbers in the diagram is chosen at random.


- Find the probability that the number is in set B' ?
- Find the probability that a number is in set A ?
- Determine $P(A \cup B')$.

11. Chances Are

Chances Are

Are you willing to take your chances with any of these games?

Which one has the best odds of winning?



To win, spin a coin and get 12 heads in a row!

Roll a 6 on our ten-sided die four times in a row to win!

Pick my favourite 4 of these 10 pictures and put them in order to win

Throw five dice and get five sixes, and you win!

These are my seven favourite plants. Put them in the right order to win.

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12. A Three-Peat

A Three-peat

Three tennis balls numbered 1, 2, and 3 are placed in a bag. A ball is drawn from the bag and the number is recorded. The ball is returned to the bag.

After this is done three times, what is the probability that the sum of the three recorded numbers is less than 8?