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CHAPTER 3 REVIEW

3.1 – SAMPLING TECHNIQUES

1. Choose the best sampling technique for each survey. Explain your choice

	TYPE OF SAMPLING Simple Random Sample Stratified Random Sample Voluntary-Response Sample Cluster Sample Convenience Sample Systematic Sample	***EXPLANATION***
(a) A bolt manufacturer wants to determine the average length of bolt being made by a machine		
(b) The president of a company wants to know which of two potential vice-presidents the employees prefer		
(c) A music store wants to know what type of music they should stock for an upcoming sale		

2. Identify the **sample** and **population** in each situation

	SAMPLE	***POPULATION***
(a) You ask every student in your class about their favourite snack to recommend the type of snacks the cafeteria should sell		
(b) All the dentists in the greater Toronto area are asked if they would recommend a new toothpaste designed to whiten teeth, so the manufacturer can indicate the percent of dentists who recommend the product on the box		
A new sandwich shop will open soon. The owners offer samples to people passing by on a busy Saturday afternoon to help them decide on their final menu		

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3. The government of Ontario wants to know how many college students find work immediately after they graduate

(a) Identify the **population** _____

(b) Is it practical to survey the *entire* population? _____ Explain

(c) How could the population be surveyed effectively?

(d) What would be a good **sampling technique** for the survey? _____ Explain.

4. Renee works as a quality control officer at a lumber yard. She selects every 200th two-by-four that is cut and measures its dimensions

(a) What type **sampling technique** is she using? _____

(b) Why is it not practical to measure every two-by-four?

(c) How could Renee *improve* her sampling technique?

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3.2 – COLLECT AND ANALYSE DATA

1. Identify each as a **primary** or **secondary source** of data

(a) Rachel has her friend Siobhan survey students at her school about their musical preference _____

(b) Monique asks students in her science class to suggest the most important scientific discover over the past 100 years _____

(c) Ruis checks Statistics Canada to find out which Ontario provincial park is the largest _____

(d) Travis' survey indicated that almost 40% of his friends have the same lunch every Monday _____

3. Identify the **bias** in each sample

	BIAS
(a) A phone-in radio show asks callers their opinion about the city's baseball team not making the playoffs the day after they are eliminated	
(b) To learn which team Canadians feel will win the Stanley Cup, researchers call 100 people from Ottawa	
(c) TO find the age that most Canadians feel should be the legal driving age, researchers ask 3000 high school students	

4. A popular televisions sports show asked people to phone in their pick for the NBA Most Valuable Player. With 30 minutes left in the show, they announce the results at that point

(a) How might this announcement affect the final results of the survey?

(b) Does reporting the early results make the survey biased? _____ Explain

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5. Explain the <u>difference</u> between **response bias** and **non-response bias**

Response bias:

Non-response bias:

6. Melissa asks five of her friends about their favourite type of movie. Four say their favourite is comedy. Melissa then reports that **80% of teenagers** prefer comedies over all other movie types. Explain <u>two</u> flaws in her survey

1.

2.

3.3 – DISPLAY DATA

1. Classify each set of data as **continuous** or **discrete**

(a) Temperature measured throughout the day _____

(b) The number of students in math classes in every high school in Ontario _____

(c) The value of an investment at the end of each month _____

(d) The volume of air in an average breath taken by students in your math class _____

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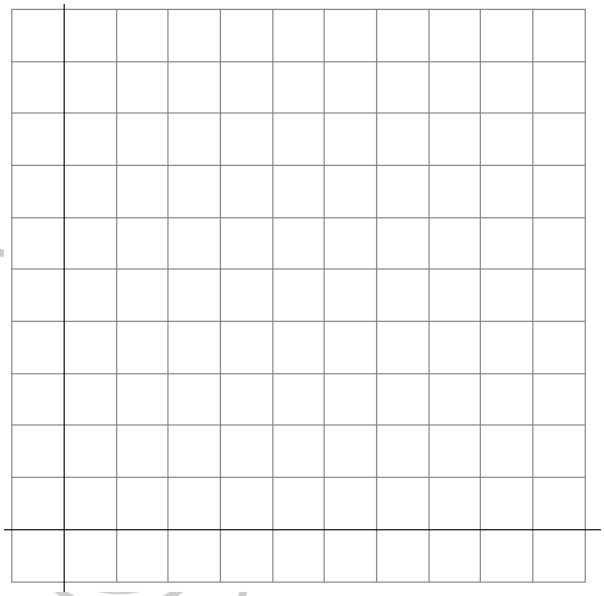
2. Tania recorded the types of CDs sold at her music store this past weekend on the chart provided. Construct a **bar graph** to represent the data

CD Type	Number Sold
Rock	224
R&B	51
Hip Hop	366
Heavy Metal	180
Alternative	294
Other	37



3. Elijah recorded the choice of students ordering lunch at the school cafeteria yesterday. His results are show in the bar graph

(a) Which was the **most popular** lunch?

_____

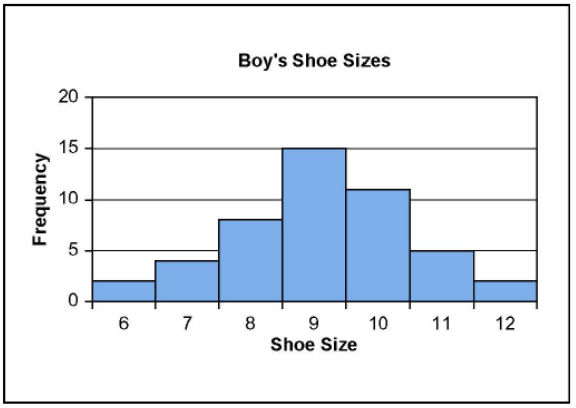
(b) How many students chose **soup and salad**?

_____

(c) How many students purchased a lunch yesterday?

_____

4. The histogram shows the distribution of shoe sizes of Grade 9 boys



(a) How many boys were surveyed? _____

(b) How many boys have a shoe size of **10 or larger**?

_____

(c) How many boys have a shoe size of **8 or smaller**?

_____

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3.4 – MEASURES OF CENTRAL TENDENCY

1. For each set of data, calculate the **mean, median** and **mode**

(a) 41, 54, 62, 63, 63, 67, 77, 81, 84, 89

Mean = **Median =** **Mode =**

(b) 0, 1, 1, 2, 4, 8, 13

Mean = **Median =** **Mode =**

2. A chart details the number of employees and their yearly income for a music label. Use the chart to help you calculate the **mean, median** and **mode**. An example has been provided for you

# of employees	***Yearly income***	***Totals***
200	$53000	200 x $53000 = **$10 600 000**
60	$63000	
5	$73000	
TOTAL # OF EMPLOYEES		***TOTAL***

Mean = ***Median =*** ***Mode =***

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3. Ms Zhang gave her class a two-question math quiz. **10 students scored 0%, 10 students scored 50%** and **10 students scored 100%**. Calculate the **mean, median** and **mode**

Mean = ***Median =*** ***Mode =***

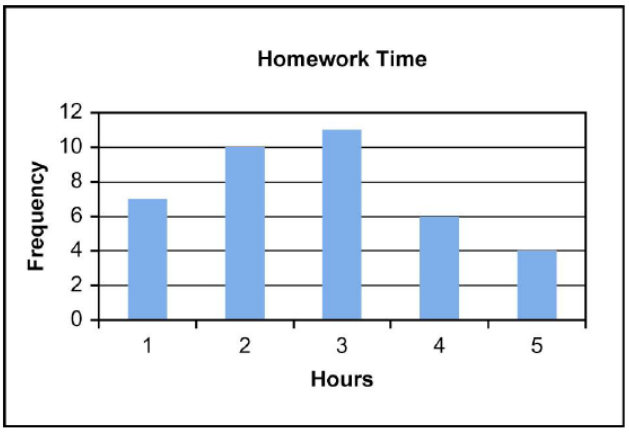
4. Suzie played 8 rounds of golf. Her scores were

81 83 84 85 86 86 87 88

Calculate the **mean, median** and **mode**

Mean = ***Median =*** ***Mode =***

5. Max recorded the average number of hours students in his class spend doing homework on the weekend. The results are shown on the graph



Determine the **mean, median** and **mode**

Mean =

Median =

Mode =

3.5 – MEASURES OF SPREAD

1. For each variance, determine the **standard deviation**

(a) 85 m = _____ (b) 27 g = _____ (c) 38 L = _____

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2. For each standard deviation, determine the **variance**

(a) 18.8 cm = _____ (b) 2.7 mg = _____ (c) 11 min = _____

3. Determine the **range** for each set of data

(a) 82, 71, 52, 15, 85, 88, 92, 87, 56, 53 _____

(b) 2, 7, 9, 8, 7, 11, 4, 1, 8, 7, 5, 7, 12, 8, 6, 6, 2, 3, 15 _____

(c) 112, 185, 214, 87, 125, 167, 181, 93, 154, 162, 111, 84 _____

4. (a) Below are the number of minutes Elyse used on her cell phone per week

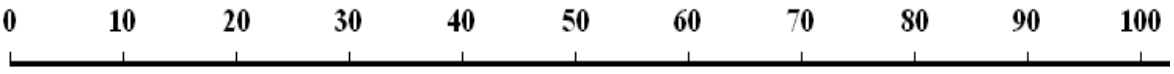
42 49 54 55 62 63 63 67 70 71 77 83

Calculate/determine the

Median = **Q1 (first quartile) =** **Q3 (third quartile) =**

Interquartile range =

Box and whisker plot



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(b) The marks on the most recent Math test

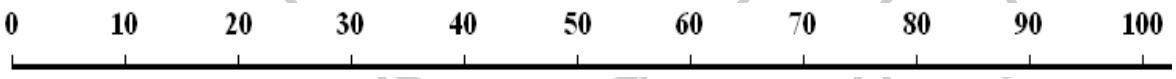
41 53 54 58 67 72 73 75 77 81 81 84 85 93

Calculate/determine the

Median = **Q1 (first quartile) =** **Q3 (third quartile) =**

Interquartile range =

Box and whisker plot



5. For each set of data, calculate the **mean**, **range, variance** and **standard deviation**

(a) Archery scores in a flight of three arrows

21 26 26 28 30 31

Mean = **Range =**

Variance =

Standard deviation =

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(b) The marks on an English test

55 62 62 67 68 71 71 73 74 77

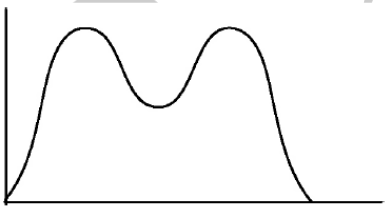
Mean = **Range =**

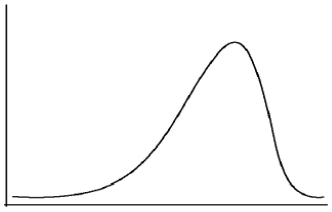
Variance =

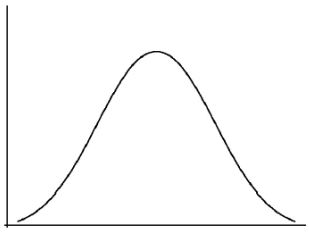
Standard deviation =

3.6 – COMMON DISTRIBUTIONS

1. Classify each distribution as **normal, skewed** or **bimodal**

(a) 

(b) 

(c) 

2. Identify the **type of distribution** for each scenario and provide an explanation

	TYPE OF DISTRIBUTION (normal, skewed, bimodal)	***EXPLANATION***
(a) Salaries of employees in a large company		
(b) Heights of pro basketball player in the NBA and WNBA		
(c) The prices of computers at retail stores in Hamilton		

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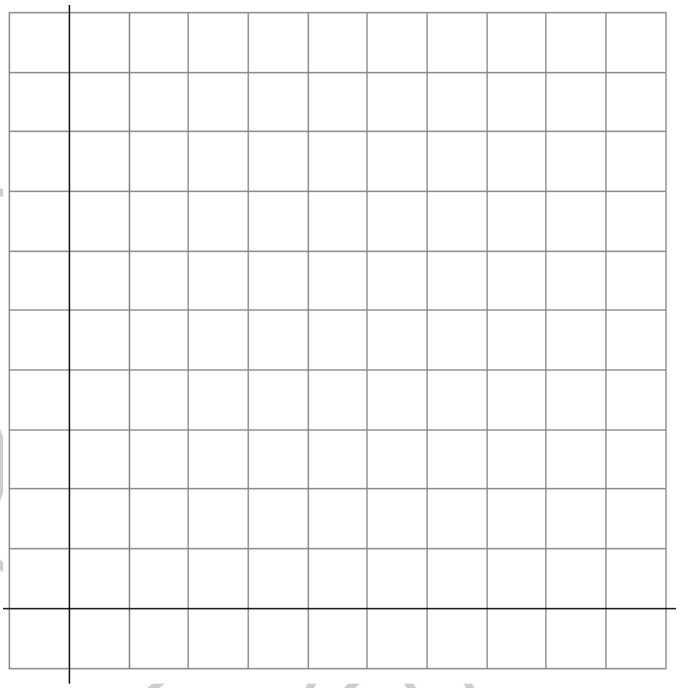
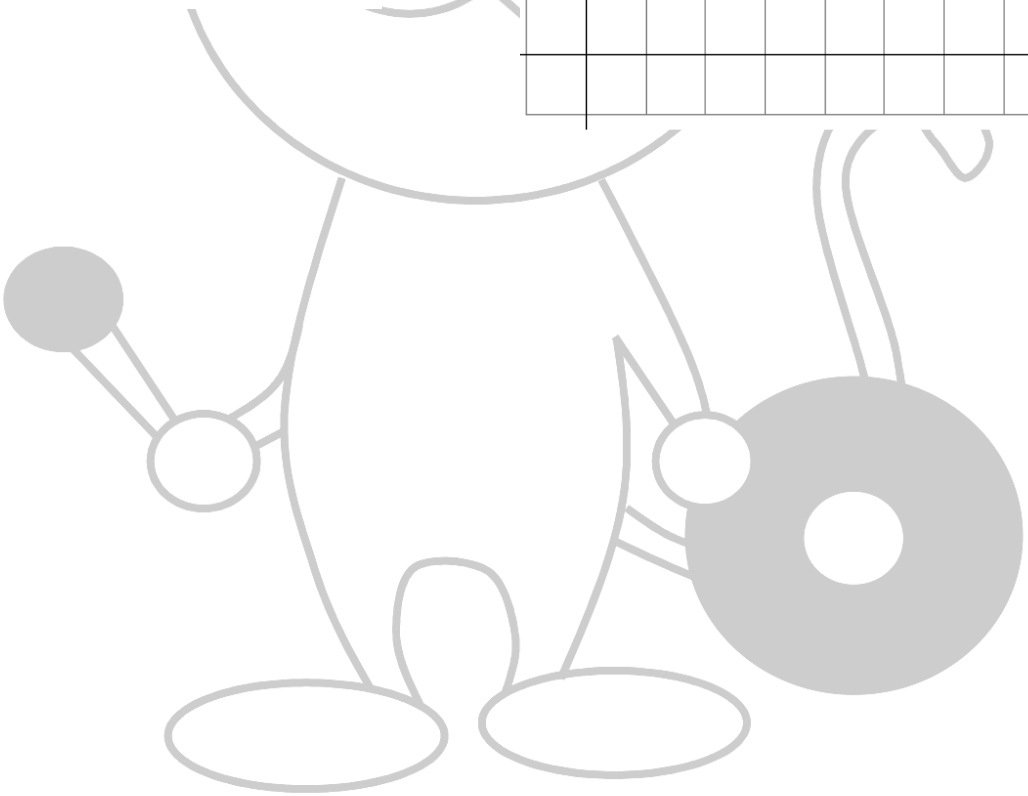
3. The scores on a difficult math test in the final year of a college business program are shown in the table. Display the data using a **histogram**. Identify the **type of distribution** displayed by the graph _____

Interval	Frequency
under 30	11
[30, 40)	26
[40, 50)	38
[50, 60)	21
[60, 70)	14
[70, 80)	3
[80, 90)	1
[90, 100)	0





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SOLUTIONS

3.1

1. (a) Systematic (b) Simple random (c) Voluntary

2. (a) Sample – Students in the class, Population – Students in the school

   (b) Sample – Dentists in Toronto, Population – Dentists in Ontario

   (c) Sample – Customers walking by, Population – Potential customers

3. (a) Every graduating college student in Ontario

   (b) No. Too many graduates

   (c) Answers will vary

   (d) Answers will vary

4. (a) Systematic sampling (b) Takes too long

   (c) Choose every 50^{th} or 100^{th} two-by-four

3.2

1. (a) Secondary (b) Primary (c) Secondary

   (d) Primary

2. (a) Few people alive from 2010 (b) Databases

   (c) More accurate – direct source

3. (a) Answers will vary (b) Biased sample

   (c) Answers will vary according to age

4. (a) Leading answer could lead to biased selection

   (b) Most likely

5. Response bias is based on how a statement is worded. Non-response bias involves low or no rate of response

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6. Sample size too small, sample is the same age as surveyor (similar interests)

3.3

1. (a) Continuous (b) Discrete (c) Discrete (d) Continuous

2. Graph

3. (a) Submarine sandwhich (b) 29 students (c) 210 students

4. (a) 47 boys (b) 18 boys (c) 14 boys

3.4

1. (a) Mean = 68.1, Median = 65, Mode = 63

   (b) Mean = 4.2, Median = 2, Mode = 1

2. Mean = $55641.51, Median = $53000, Mode = $53000

3. Mean = 50, Median = 50, Mode = 0, 50 and 100

4. Mean = 85, Median = 85.5, Mode = 86

5. Mean = 2.7, Median = 3, Mode = 3

3.5

1. (a) 9.2 m (b) 5.2 g (c) 6.2 L

2. (a) 353.44 cm (c) 7.29 mg (c) 121 min

3. (a) 77 (b) 14 (c)130

4. (a) Median = 63, Q1 = 54.5, Q3 = 70.5, Interquartile range = 16

   (b) Median = 74, Q1 = 58, Q3 = 81, Interquartile range = 23

5. (a) Mean = 27, Range = 10, Variance = 10.7, Standard deviation = 3.27

   (b) Mean = 68, Range = 22, Variance = 40.2, Standard deviation = 6.3

3.6

1. (a) Bimodal (b) Skewed (c) Normal

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2. (a) Skewed (b) Bimodal (c) Normal

3. (a) Histogram (b) Skewed

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