Name: _____

Bayview Secondary School [Course Code: MDM4U1]
Assessment for Learning: 1- & 2-Variable Statistics

Knowledge (13)	Application (18)	Thinking (7)	Communication (5)

Instructions:

1) Show all necessary steps and work clearly in your calculations to demonstrate your understanding of the concepts and chain of thoughts to obtain full marks for questions that are worth more than one mark.
2) DO NOT round any numbers in any steps of your solutions. Round only the final answers in approximate values to **3 decimal places** unless specific instructions are given in the question.
3) Graphing calculators, cell phones, audio- or video-recording devices, digital music players or, e-mail or text-messaging devices are prohibited during the assessment.
4) Use only the space provided to complete the assessment.
5) Two marks are awarded for proper mathematical form throughout the assessment. [2 marks]

Knowledge and Understanding

1) Jane receives the marks shown below for her data management course. Determine Jane's **final report card mark**. [4 marks]

Category	Mark (%)	Category Weight (%)	Course Weight (%)
Knowledge	83	22	70
Application	70	28	
Communication	71	10	
Thinking	52	10	
ISP	75		15
Final Exam	85		15

2) For the follow set of data, determine the **sample standard deviation**. [3 marks]

44, 67, 94, 36, 33, 68

3) Scores on a data management quiz are shown below. Determine the **outlier(s)**. [4 marks]

2	2	3	8	8	9	9	9	10	10
11	11	11	12	12	13	13	14	17	22

4) The scores on a precision-driving test for prospective drivers at a transit company have a mean of 100 and a standard deviation of 15. Determine the **z-score** for raw score of 92. [2 marks]

Thinking

5) A laboratory technician monitors the growth of a bacterial culture by scanning it every hour and estimating the number of bacteria.

Time(h)	0	1	2	3	4	
Population	5	10	21	43	82	

a) Determine and describe the strength of the **coefficient of correlation**. [4 marks]

b) Suppose that the laboratory technician takes further measurements of the bacterial culture for another 7 hours and determine an exponential curve of best fit for the model with a coefficient of determination of $r^2 = 0.986$. Compare to the r-value from a), which model (linear or exponential regression) is a better fit? Explain. [3 marks]

Communication

1) A study concludes that the price of gas goes up as the prices of cars go up. What type of **causal relationship** is it? Explain. [3 marks]

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Application

2) An information booth at a tourist attraction collected the following data about the age group of the tourists came to the booth and picked up a map within an hour.

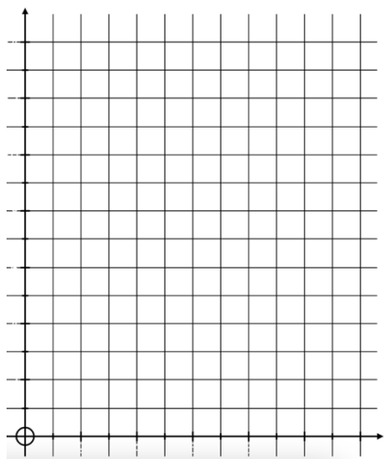
a) Complete the **relative frequency** column from the table [1 mark]

b) Determine the **mean** of the data set. [2 marks]

Age (years)	Frequency	Relative Frequency
$28 \leq x < 32$	6	
$32 \leq x < 36$	8	
$36 \leq x < 40$	5	
$40 \leq x < 44$	9	
$44 \leq x < 48$	4	

c) Determine the **median** of the data set. [2 marks]

d) Construct a cumulative frequency **histogram** on the grid. Be sure to label the graph. [3 marks]



3) The scores on a test worth 40 marks are shown below.

17	20	21	23	23	24	25	26	29	30
30	31	31	33	34	34	37	39	40	40

a) If a student scores at the **80th percentile**, what is the student's raw score? [2 marks]

b) In which **percentile** are the students who scored 30 out of 40? [2 marks]

c) Draw a **box-and-whisker plot** (not modified). [3 marks]

4) Given the following set of data, determine the **equation of the linear regression** using the least-square method. [3 marks]

x	y			
6	6			
11	5			
10	3			
7	7			
5	4			
8	5			

-- End of Assessment ---

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Formulas

$x - \mu$	$x - \bar{x}$	$\bar{x} = \frac{\sum x}{n}$	$\overline{x_w} = \frac{\sum w_i x_i}{\sum w_i}$	$z = \frac{x - \bar{x}}{s}$
$interval\ size = \frac{Max - Min}{\#\ of\ desire\ intervals}$	$R = \frac{p}{100}(n+1)$	$p = 100\left(\frac{L + 0.5E}{n}\right)$	$IQR = Q3 - Q1$ $SIQR = \frac{IQR}{2}$	$Q1 - 1.5IQR$ $Q3 + 1.5IQR$
$\sigma = \sqrt{\frac{\sum(x-\mu)^2}{N}}$	$s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$	$\sigma^2 = \frac{\sum(x-\mu)^2}{N}$	$s^2 = \frac{\sum(x-\bar{x})^2}{n-1}$	$z = \frac{x - \mu}{\sigma}$
$S_{xy} = \frac{1}{n-1}\left(\sum xy - \frac{\sum x \sum y}{n}\right)$		$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$		
$a = \frac{n\sum xy - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$		$b = \bar{y} - a\bar{x}$		