

CENTENNIAL C.V.I.  
MATHEMATICS - MDM 4U1

Teachers:

Date: \_\_\_\_\_  
Time: 1:00 p.m. - 3:00 p.m.  
Page 1 of 5

Name: \_\_\_\_\_ /33K \_\_\_\_\_/9C \_\_\_\_\_/26A

Notes: \* Circle your teacher's name.

\* Programmable and graphing calculators are not permitted.

\* Your clarity and correctness of written expression will be taken into account in determining the final mark for this examination.

**Part A: Multiple Choice.** *Select the best answer by circling the corresponding letter.*  
*{12 Knowledge/Understanding Marks}*

- The interquartile range for a set of data is defined as :  
a)  $Q_2 - Q_1$       b)  $Q_3 - Q_1$       c)  $Q_3 - Q_2$       d) the median  $\times$  2.5
- A set of data has a mean of 100 and a standard deviation of 15. The z-score for a raw score of 160 is :  
a) -4      b) 75      c) 4      d) none of these
- A value for the linear correlation coefficient,  $r$ , that is moderate and negative is :  
a) -0.25      b) -0.8      c) 0.4      d) -0.5
- The number of permutations of the letters of the word "COMPUTER" is :  
a) 8!      b)  $P(8,8)$       c) 40320      d) all of these
- The number of permutations of the letters of the word "CALCULUS" is :  
a) 40320      b) 5040      c) 10080      d) 20160
- From a deck of 52 cards, the number of possible 5 card hands with 2 hearts and 3 spades is :  
a)  $C(52,5)$       b)  $C(13,5)$       c)  $C(13,2) \times C(13,3)$       d)  $C(26,5)$
- The number of different burgers, with at least one topping, that can be made from a selection of six toppings is :  
a) 64      b) 63      c) 720      d) none of these
- If the odds in favour of an event "A" are 3:5, then the probability of event A is :  
a)  $\frac{3}{5}$       b)  $\frac{3}{8}$       c)  $\frac{5}{8}$       d)  $\frac{2}{5}$
- If  $P(A) = 0.5$ ,  $P(B) = 0.4$  and events "A" and "B" are independent, then  $P(A \text{ and } B) =$  :  
a) 0.2      b) 0      c) 0.5      d) 0.9
- If  $P(A)=0.5$ ,  $P(B)=0.4$  and events "A" and "B" are mutually exclusive, then  $P(A \text{ or } B) =$  :  
a) 0.2      b) 0      c) 0.5      d) 0.9
- Two standard dice are rolled. The probability of rolling a sum of ten or doubles is :  
a)  $\frac{1}{4}$       b)  $\frac{2}{9}$       c)  $\frac{1}{36}$       d)  $\frac{1}{6}$
- The percent of data within 2 standard deviations of the mean in a normal distribution is approximately:  
a) 68%      b) 89%      c) 95%      d) 99.7%

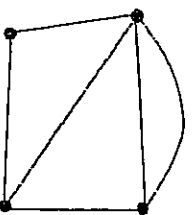
Part B: Show full solutions for the following questions in the space provided.

1. Let  $A = \begin{bmatrix} -3 & 5 \\ 1 & 7 \end{bmatrix}$ ,  $B = \begin{bmatrix} -2 & 0 \\ 4 & -9 \end{bmatrix}$  and  $C = \begin{bmatrix} 6 & -4 \\ 1 & 5 \end{bmatrix}$ . Determine :
- a)  $2A + C$                       b)  $BC$                       c)  $C^2$

[6K]

2. Determine if the following network is traceable. Explain why or why not.

[2C]



3. A survey of 100 consumers' snacking preferences collected the following data:
- 70 ate chips, 59 ate pretzels and 34 ate almonds
  - 41 ate chips and pretzels
  - 15 ate chips and almonds
  - 17 ate pretzels and almonds
  - 6 ate all three.

- a) Draw a Venn diagram illustrating the above information.

[4C]

- b) How many consumers do not eat chips, pretzels or almonds?

[2K]

- c) How many consumers only eat chips?

4. Use the binomial theorem to expand  $(x + 2y)^4$

[3K]

5. Determine the number of different paths that will spell WINTER from left to right.

	N	E	R	E	R
	I	T	E	R	
W	N	T	E	R	
[2A]	I	T	E	R	
	N	E	R		

6. The scores in a recent bowling tournament are as follows:

150	212	189	144	173	209	141	162
150	190	218	137	186	241	199	

a) Determine the mean (to one decimal place), the median and the mode.

b) If  $\sum (x - \bar{x})^2 = 144446.95$ , determine the sample standard deviation to two decimal places.

[10K]

c) What score is at the 50<sup>th</sup> percentile?

d) Illustrate this data using a box-and-whisker plot.



7. Andrew and Becky play competitive Yahtzee. After winning a game, Andrew has a 60% chance of winning the next game. Similarly, Becky has a 55% chance of winning after she has won a game. Andrew won the first game.

a) Draw a probability tree illustrating the next 2 games played and show the probabilities for each branch

[3C]

b) What is the probability of

(i) Andrew winning games two and three?

(ii) Becky winning one game only?

[3A]

8. A lottery has sold 100 000 tickets at \$2 each. The prizes are shown in the table. Determine the expected value per ticket.

Prize Value	\$50 000	\$1 000	\$100	\$10
Number Sold	1	10	50	100

[3A]

9. Suppose that 78.4% of Centennial students have a computer at home. If 6 students are selected at random, what is

a) the probability that 4 have a computer at home (to 4 decimal places)?

b) the probability that at least one student has a computer at home (to 4 decimal places)?

[5A]

c) the expected number of students who have a computer at home?

10. The speed limit on a highway is 100 km/h. A sample of cars shows that their speeds are normally distributed with a mean of 102 km/h and a standard deviation of 9 km/h.

a) What is the probability that a randomly selected car is not speeding?

b) If drivers receive speeding tickets for exceeding the posted speed limit by 15%, what is the probability that a driver will receive a ticket?

[7A]

c) What is the probability that a car drives between 84 km/h and 120 km/h?

11. It is known that about 10% of the population is left-handed. In a sample of 100 people, determine (using the normal distribution as an approximation)

a) the mean and standard deviation.

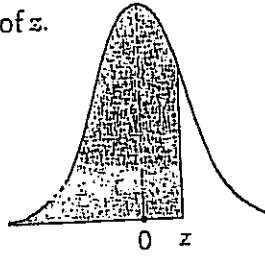
b) the probability that more than 12 people are left-handed.

[6A]

c) the probability that exactly 12 people are left-handed.

**Areas Under the Normal Distribution**

The table lists the shaded area for different values of z.  
The area under the entire curve is 1.



0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986

$$\sigma = \sqrt{\frac{\sum (x - \mu)^2}{N}}$$

Standard Deviation Formula:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$