MDM 4U PRACTICE EXAMINATION

This is a practice exam. It does not cover all the material in this course and should not be the only review that you do in preparation for your final exam. Your exam may contain questions that do not appear on this practice exam. Ideally, this should be completed after you have completed the final exam review. Your actual examination is on 'legal sized' paper, this practice is on 'letter sized' paper so that it was easier for you to print from home.

Instructions:	**1.**	**Read all questions carefully.**
	2.	**Answer all questions on the exam paper. Part A requires answers only but part B requires full model solutions.**
	3.	**Scientific calculators are permitted.**
	4.	**A z-score table and formulas are provided**

Part A

Each correct answer is worth one mark. Place answers in the space provided.

1. How many ways can 7 friends be arranged in a line for a photograph _____

2. Evaluate the following P(11,5) _____

3. How many possible combinations are there in a lottery draw of 6 numbers from 49? _____

4. What is the sum of the squares of the nth row of Pascal's triangle? _____

5. How many arrangements of the word "HOTDOGS" are there? _____

6. How many proper subsets can be made from a set of 5 elements? _____

7. How many ways can 5 friends be seated around a circular table? _____

8. Joe asks his family to complete a survey, what type of sampling is this? _____

9. Simplify 72 x 7! into factorial notation. _____

10. True or False: In a double blind study researchers are unaware of who is in the control group. _____

11. A coin is flipped 3 times, what is the probability that all 3 times it is a head? _____

12. The 75th percentile corresponds with what quartile? _____

13. What is another name of quartile Q_2? _____

14. What are the odds of drawing a face card from a standard deck of 52? _____

15. In a probability distribution was does $\sum p(x)$ equal? _____

16. Approximately what % of data lies within 3 standard deviations of the mean in a normal distribution? _____

17. What does H_1 refer to in hypothesis testing? _____

18. True or False: In order to conduct a census you must ask the entire population of the country. _____

19. What symbol is used for the 'coefficient of determination'? _____

20. State the $Z_{\frac{\alpha}{2}}$ value for a 90% confidence interval in a normal distribution. _____

Part B

Complete, clear and concise MODEL SOLUTIONS are required so that part marks can be awarded. Marks will be shown in brackets on the actual examination.

1. A car part is to be manufactured to a length of 16cm. If the machine makes parts that are normally distributed with a standard deviation is 0.2cm determine how many parts will be rejected at less than 15.7 cm.

2. The following are the heights of grade 12 students in Data Management at Grimsby Secondary School.

Height (cm)	Frequency
122.5-127.5	5
127.5-132.5	4
132.5-137.5	10
137.5-142.5	3
142.5-147.5	3

a. Complete an extended frequency table in the space provided above. Use appropriate columns including the midpoint.

b. Determine the mean height of the students in the class using the extended frequency table.

c. What is the modal interval?

d. Determine the standard deviation of the heights using the extended frequency table.

3. In the first try out of the year, the boy's soccer coach made the team do sit-ups.
Below is a list of the number each student could do in 3 minutes.

45	25	20	80	55	46	45	50	54	44
42	41	20	21	30	50	44	42	51	37
38	40	42	39	38	52	62	64	48	47

a. Determine the mean number of push-ups that can be done by a team member.

b. Determine the median number of sit-ups.

c. Determine the inter-quartile range

d. Determine the 60^{th} percentile

e. Construct a relative frequency graph for the number of sit-ups following the guidelines provided in class.

4. A study found that the average time it took for a university graduate to find a job was 5.4 months, with a standard deviation of 0.8 months. If a sample of 64 graduates were surveyed, determine a 95% confidence interval for the mean time to find a job?

5. It is currently believed that 70 percent of the population believe that smoking should be banned from school property. If a survey of 30 people is chosen and it is found that 25 of them believe smoking should be banned, is this result significant to 5%? (Use good form)

6. A family of 7 sits in a row at the theatre, how many ways can they be arranged if…

a. There are no restrictions?

b. Mom and dad must be together?

c. The oldest refuses to sit in the middle?

d. The oldest and youngest must sit on either end? (not one particular end)

7. Given the two sets below determine each of the following.

$A = \{1,3,5,7,9\}$ *and* $B = \{2,7,9\}$

a. n(A)

b. $A \cup B$

c. n($A \cap B$)

8. A multiple-choice test has 11 questions each of which each has 4 possible answers. If you randomly select answers.

a. What is the probability that you get exactly 2 of the questions right?

b. What is the probability that you pass? (>50%)

c. What is the probability you get at least one right?

9. What is the probability of drawing a heart from a deck of cards and then rolling a sum larger than 4 with two die?

10. Sally applies to three universities for her post secondary education. If there is an 85% probability that Sally will be accepted into the Engineering program at Waterloo, a 75% probability that she will be accepted to Computer Programming at McMaster and an 88% probability she will be accepted to the University of Ottawa for the Mathematics program, what is the probability that she will be accepted to all three of the programs she has applied for?

11. A sub-committee of 4 is to be selected from the 9 girls and 5 boys on the school council.

a) What is the probability that exactly 3 of them are girls?

b) What is the probability that at least 2 of them are girls?

12. A poker hand of 5 cards is dealt from a standard deck of 52. What is the probability of the hand containing …

a. Exactly 1 ace

b. ***<u>At least</u>*** 2 aces

c. Four Spades

d. 2 Aces and 3 Queens

e. 2 spades, 2 clubs and a diamond

f. A full house

13. Two die are rolled and the sum of the up-faces are noted. Use good form including let statements to answer each of the following questions.

a) What is the probability of rolling a 6?

b) What is the probability of a six given that the first die is a 2?

c) What is the probability of a seven given that only one of the die is a 3?

14. It is estimated that 15% of the Canadian population is undecided as to which political party to vote for in the next election. If a poll is conducted and 1007 citizens respond to the questionnaire, what is the probability that more than 100 of them are undecided? (Hint: Use the normal approximation of a binomial distribution)

15. A game is designed in which you roll two die and the sum is noted, if you roll doubles you win $100, if you roll 5 you win $25 and on all else you pay $5.

a. Complete a distribution table for the amount you win/lose. Include an X, p(x) and x.p(x) column.

b. What is the amount that you would expect to win/lose if you played the game 10 times?

Equation Sheet

$$P(A)=\frac{n(A)}{n(S)}$$

$$P(A)+P(A')=1$$

$$P(A \text{ and } B)=P(A)\times P(B)$$

$$P(B/A)=\frac{P(A \text{ and } B)}{P(A)}$$

$$P(A \text{ or } B)=P(A)+P(B)$$

$$P(A \text{ or } B)=P(A)+P(B)-P(A \text{ and } B)$$

$$P(x)=\frac{1}{n}$$

$$E(x)=\sum_{i=1}^{n} x_i P(x_i)$$

$$P(x)=\binom{n}{x}p^x q^{n-x}$$

$$E(x)=np$$

$$P(x)=q^x p$$

$$E(x)=\frac{q}{p}$$

$$P(x)=\frac{\binom{a}{x}\binom{n-a}{r-x}}{\binom{n}{r}}$$

$$E(x)=\frac{r\,a}{n}$$

$$\mu = n\,p$$

$$\sigma=\sqrt{n\,p\,q}$$

$$z=\frac{x-\mu}{\sigma}$$

$$\bar{x}=\frac{\Sigma x_i\, f_i}{\Sigma f_i}$$

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

$$\bar{x}-z_{\frac{\alpha}{2}}\frac{\sigma}{\sqrt{n}}<\mu<\bar{x}+z_{\frac{\alpha}{2}}\frac{\sigma}{\sqrt{n}}$$

$$\hat{p}-z_{\frac{\alpha}{2}}\frac{\sqrt{pq}}{\sqrt{n}}<p<\hat{p}+z_{\frac{\alpha}{2}}\frac{\sqrt{pq}}{\sqrt{n}}$$

$$(p+1)(q+1)(r+1).....-1$$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
– 2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
– 2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
– 2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
– 2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
– 2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
– 2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
– 2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
– 2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
– 2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
– 2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
– 1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
– 1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
– 1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
– 1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
– 1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
– 1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
– 1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
– 1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
– 1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
– 1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
– 0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
– 0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
– 0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
– 0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
– 0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
– 0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
– 0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
– 0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
– 0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986