Venn Secondary School
Math Department
-Month- 20XX Practice Final Examination

/92

Student Name: _____

Course Code: MDM4U - XX

Period: XX

Teacher: Bility, Proba

Total Marks: 92

Textbook Title: Mathematics of Data Management
McGraw Hill Ryerson

Date: -Weekday-, -Month- XX, 20XX

Start Time: 9:00 a.m.

End Time: 11:00 a.m.

Exam Value: 15%

Number of pages: 9 including cover page

STUDENTS ARE PERMITTED TO BRING & USE A:	STUDENTS WILL BE PROVIDED WITH THE FOLLOWING:
☐ Print Dictionary (English only)	☐ Foolscap
☐ Print Thesaurus	☐ Scantron (#_____)
☑ Scientific Calculator	☐ Graph Paper
☐ Study Sheet/Memory Aid	☐ Periodic Table
☐ Textbook	☐ Data Booklet
☐ Other:_____	☑ Formula Page
	☑☐ Other: ____z-score table_____

SPECIAL INSTRUCTIONS:

1. Graphing calculators are NOT permitted.

2. ELL may use a PRINT dictionary and may NOT use an electronic dictionary.

3. Any rough work must be done on the back side of the exam pages

4. All diagrams are not drawn to scale.

INSTRUCTIONS:

1. **No sharing of any materials**
2. **All work is to be done in the space provided, answers written in extended pages will not be marked.**
3. **Appropriate steps and proper mathematical form are required for full marks**
4. **Non-programmable, non-graphing calculators may be used but not shared**
5. **The use of cellphones, audio- or video-recording devices, digital music players or email or text-messaging devices during the exam is prohibited**
6. **All answers must be in exact answers OR round to 4 decimal places**
7. **Formulas and z-score table are on page 9**
8. **Three marks will be awarded for appropriate use of mathematical form and the clarity and conciseness of solutions**

Good luck!

Part A Multiple Choices (10 marks – 1 mark each)

Place the CAPITAL LETTER of the most appropriate choice in the box provided for each question.

1) How many three-digit numbers can be made from the digits 1 to 5 if repetition is allowed and the number must be less than 300?

   A. $\mathbf{12}$ B. $\mathbf{50}$ C. $\mathbf{60}$ D. $\mathbf{125}$

2) In how many ways can a chairman, treasurer, and secretary be selected from a Board of Directors with eight members?

   A. $\boldsymbol{P(8,3)}$ B. $\boldsymbol{P(8,4)}$ C. $\mathbf{3}!$ D. $\mathbf{8}!$

3) The starting line-up for a basketball team consists of two forwards and three guards. Two brothers are on the team. Sina is a forward and Justin is a guard. There are four forwards and six guards from which to choose the line-up. If the starting players are chosen at random, what is the probability that the two brothers will end up in the starting line-up?

   A. $\mathbf{0.50}$ B. $\mathbf{0.20}$ C. $\mathbf{0.75}$ D. $\mathbf{0.25}$

4) What are the odds against randomly picking a red apple from a fruit bowl containing seven green apples and four red apples?

   A. $\frac{7}{4}$ B. $\frac{7}{11}$ C. $\frac{4}{7}$ D. $\frac{4}{11}$

5) A number is chosen randomly from the first 30 natural numbers. If event A = {multiples of 3 OR multiples of 2}, what is the value of $\boldsymbol{P(A)'}$?

   A. $\frac{19}{30}$ B. $\frac{11}{30}$ C. $\frac{9}{30}$ D. $\frac{1}{3}$

6) Choose the correct example for a continuous variable
   a) The number of people in a room
   b) How old someone is
   c) Number of apples in a supermarket
   d) All of them are examples of a continuous variable

7) In which situation would you use permutations?
   a) Determine how many ways can 2 apples be chosen from a bag of 5 fruits
   b) Determining the number of arrangements for 10 students in a row
   c) Determining the number of possible passwords if it has to contain at least 2 numbers and 2 letters
   d) B and C

8) If the correlation coefficient is $-\mathbf{0.4}$, this indicates that there is a
   a) Moderate negative correlation
   b) Moderate positive correlation
   c) Strong negative correlation
   d) Weak positive correlation

9) When can normal approximation to binomial be used?
   a) When $\boldsymbol{np}$ is greater than 5 and $\boldsymbol{nq}$ is less than 5
   b) When $\boldsymbol{np}$is greater than 5 and $\boldsymbol{nq}$ is greater than 5
   c) When $\boldsymbol{np}$ is less than 5 and $\boldsymbol{nq}$ is less than 5
   d) When $\boldsymbol{np}$ is less than 5 and $\boldsymbol{nq}$ is greater than 5

Part B Short Answers (14 marks – 1 mark each)

10) Find the number of ways of arranging the letters of MATCHING if the arrangement must end with NG.

11) The manager of a baseball team has picked the nine players for the starting line-up. In how many ways can he set the batting order so that the pitcher bats last?

12) There are 210 grade 9 students enrolled for semester 1. The following information was gathered by the guidance department to determine the number of courses taken by each student this semester.

98 students are taking Math
101 students are taking English
94 students are taking Science
43 students are taking Math and Science
60 students are taking English and Science
47 students are taking English and Math
43 students are not taking any Math, English and Science

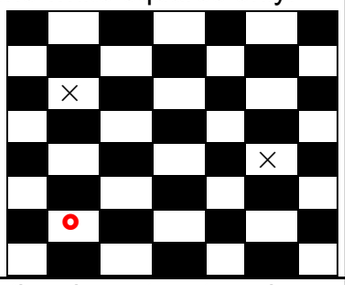
a) Draw a Venn diagram illustrating the above information?

b) How many students are taking all three courses at once?

c) How many students are taking exactly two of the three courses mentioned?

d) How many students are taking Math or Science?

13) A checker is placed on a checkerboard as shown. The checker may move diagonally upward or straight upward on the white squares only. Although it cannot move into a square with an X, the checker may jump over the X into the diagonally opposite square but not straight upward. How many paths are there to the top of the board?



14) A baby typed three strokes on a keyboard. If all the characters typed were letters of the alphabet, what is the probability that the characters that were struck were three consecutive letters in alphabetical order?

15) What is the probability that a card game of 13 cards in hand contains six spades, four hearts, two diamonds, and one club? (round the answer to 4 decimal places)

16) How many 5 letters permutations can be made from the word TEACHER?

17) How many ways can 8 DVDs be arranged on a shell?

18) How many ways are there to choose 6 candies from a bag with 30 candies?

19) Calculate the odds in favour of rolling a 1.

20) Determine the probability of getting a 3 when rolling a fair die.

21) The average number of laptops that a factory can produce in one day is $\mathbf{253}$, with a standard deviation of $\mathbf{34}$. Calculate the z-score on a day when the factory produces $\mathbf{270}$ laptops.

22) In a box with 3 bags of barbeque chips, 7 bags of sour cream and onion, and 11 bags of all dressed, determine the probability of not picking a bag of sour cream and onion chips.

23) The probability that a purchase will be made in a clothing store is $\mathbf{0.75}$. Determine the probability that the first 3 customers will not make a purchase.

Part C Long Answers (64 marks)

24) How many distinct 4-letter words can be formed from the word LOGAZBU,…

a) If all vowels are to be used? [2 marks]

b) If no vowels are to be used? [2 marks]

c) If B is not be used OR no vowels are to be used? [2 marks]

d) If Z is to be used OR all vowels are to be used? [2 marks]

e) If G and L must be used and G must come before L? [2 marks]

f) If G and L must be used and must be side by side? [2 marks]

25) 6 members are needed to form a committee from a pool or 8 men and 10 women.

a) Determine the probability distribution for the number of women in a committee is/are selected. [3 marks]

b) What is the expected number of women in a committee? [1 mark]

26) Suppose the time periods that people wait in line at a department store on a sale day are normally distributed with a mean of 10 minutes and a standard deviation of 3 minutes. Calculate the probability that a person will wait…. (round your answers to 4 decimal places if applicable)

a) between 6 minutes and 11 minutes exclusively? [2 marks]

b) more than 15 minutes or less than 13 minutes? [2 marks]

27) A random sample of 100 USB keys was tested. Calculate the probability of observing 46 or more defective keys assuming that the USB keys' average reliability is 0.60. [5 marks]

28) In a playlist, there are 8 raps songs, 3 classical songs, and 5 pop songs. If we need to choose 7 songs to create a new playlist, determine the probability that at least 2 songs will be classical. [2 marks]

29) Determine the probability that in a line at McDonald's, you will be the 3rd or the last if there are 10 people standing in line. [2 marks]

30) Of 280 students in the school, 200 are taking English, 80 are taking French, and 50 are taking Spanish. There are 23 who are taking French and Spanish, 65 who are taking English and French, 30 who are taking English and Spanish, and 17 who are taking all 3 languages. Using the principle of inclusion and exclusions, determine the number of students who are taking English, or French, or Spanish. Please draw a fully labeled Venn diagram. [2 marks]

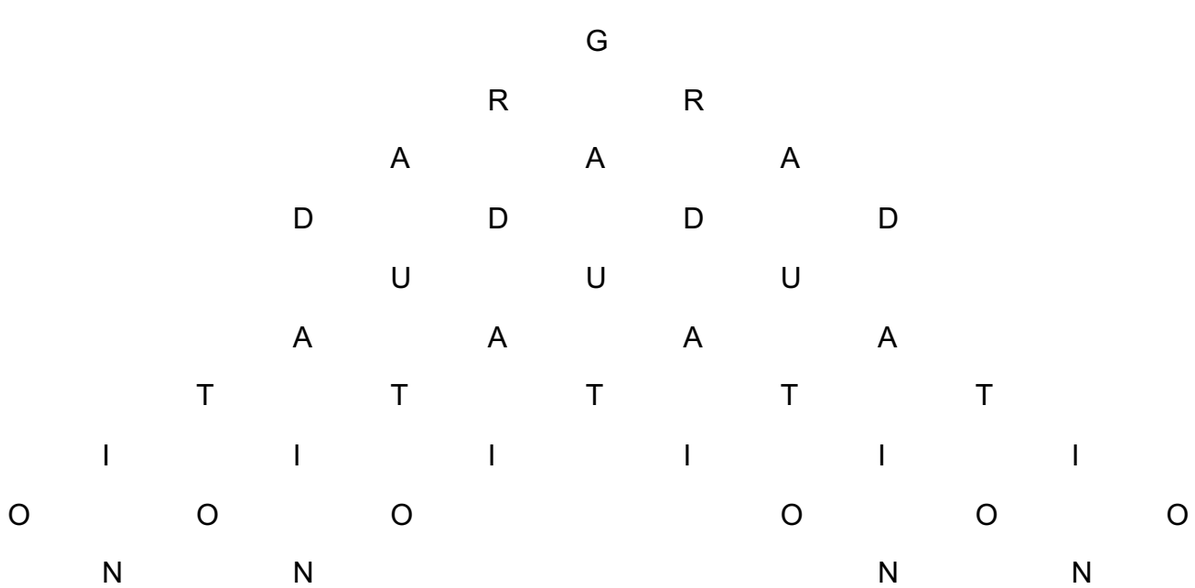
31) There are 20 females and 10 males in a class. How many ways can a group of 7 students be chosen if there has to be more than 2 females? [3 marks]

32) The probability of pass a certain exam is $\mathbf{65}\%$. If there are 30 students, determine the probability that at least 13 students do not pass the exam. [4 marks]

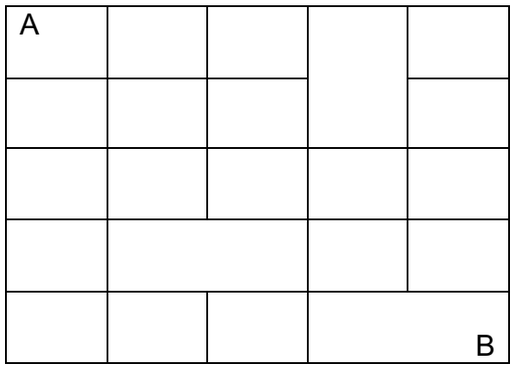
33) Solve for $\boldsymbol{n}$. $\frac{(\boldsymbol{n-4})!}{(\boldsymbol{n-6})!} = \mathbf{6}$. [3 marks]

34) On a multiple-choice quiz, there are 16 questions with 4 options each. If a student did not study for the test, determine the probability that the student will score at most 2 questions correct on the test. [3 marks]

35) How many paths through the word GRADUATION: [2 marks]



36) Determine the number of routes from A to B in the diagram if we can only travel right or down. [2 marks]



37) Consider a simple game in which you roll a single die. If you roll an even number, you gain that number of points, and if you roll and odd number, you lose that number of points.

a) Show the probability distribution of points in this game. [2 marks]

# on die	Points, $\boldsymbol{X}$	$\boldsymbol{P(X)}$	$\boldsymbol{X \times P(X)}$

b) What is the expected number of points per roll? [2 marks]

38) The results of a blood test at a medical laboratory are normally distributed with $\bar{x} = \mathbf{48}$ and $\boldsymbol{s} = \mathbf{12}$.

a) What is the probability that a blood test chosen randomly from these data has a score greater than 65? [2 marks]

b) What percent of these blood tests will have results between 50 and 70? [2 marks]

39) A computer-chip manufacturer knows that 10% of the chips produced are defective. A batch of 80 chips are selected to be tested.

a) Determine the probability that exactly 4 are defective. [2 marks]

b) Determine the probability that at least 11 chips are defective. [3 marks]

40) An admissions officer claims that the probability of a student getting accepted to a program if they have a GPA over 93% is 0.9. Student X claims that the probability that she will get accepted is 0.95, and the probability that she will have a 93% average is 0.98. If student X does get accepted, determine the probability that she has a 93% average. [4 marks]

Three marks will be awarded for appropriate use of mathematical form and the clarity and conciseness of solutions. [3 marks]

--- End of Assessment ---

Formula Sheet

$$s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}} \qquad \sigma = \sqrt{\frac{\sum f(x_i - \mu)^2}{N}} \qquad z = \frac{x - \bar{x}}{s} \qquad \bar{x} = \frac{\sum x_i w_i}{\sum w_i} \qquad \bar{x} = \frac{\sum x_i}{n}$$

$$IQR = Q_3 - Q_1 \qquad P(A) = \frac{n(A)}{n(S)} \qquad P(A') = 1 - P(A) \qquad P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$P(A \cap B) = P(A) \times P(B) \qquad P(A \cup B) = P(A) + P(B)$$

$$C(n,r) = \frac{n!}{r!\,(n-r)!} \qquad P(n,r) = \frac{n!}{(n-r)!} \qquad n! = n(n-1)(n-2)(n-3)\ldots \times 2 \times 1$$

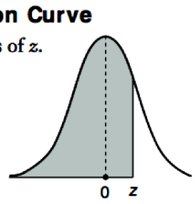
$$E(X) = \sum x_i P(X = x) \qquad \binom{n}{r} + \binom{n}{r+1} = \binom{n+1}{r+1}$$

$$P(x) = \binom{n}{x} p^x (1-p)^{n-x} \qquad E(X) = np \qquad P(x) = \frac{\binom{a}{x}\binom{n-a}{r-x}}{\binom{n}{r}} \qquad E(X) = \frac{ra}{n}$$

$$z = \frac{x - \bar{\mu}}{\sigma} \qquad \mu = np \qquad \sigma = \sqrt{npq} \qquad odds\ in\ favour\ of\ A = \frac{h}{k}, P(A) = \frac{h}{h+k}$$

Areas Under the Normal Distribution Curve

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