DAWSON COLLEGE
DEPARTMENT OF MATHEMATICS
201-MA4-DW
STATISTICS
FALL 2025
FINAL EXAM

Name:_____ Date: December 11, 2025

Student Number:_____ Time: 9:30 – 12:30

Examiner: Dr. Garry Ka Lok CHU

Instructions:

1. No books or notes are permitted.
2. Only calculators SHARP EL-531** are permitted.
3. Please show all your work clearly.
4. Please justify all your answers.
5. Cheating will result in a penalty of zero in your final grade.
6. Pease write P.T.O. if you write your answer at the back of the page.
7. Unless otherwise stated, correct your answer to 4 decimal places.

1. Assume P(A) = 0.30, P(B) = 0.60 and P(A | B) = 0.40.

   a. [2 Marks] Find P(A and B).

   b. [2 Marks] Are events A and B independent? Explain.

   c. [2 Marks] Find P(B | A).

   d. [2 Marks] Find P(A or B).

2. The probability of a tourist visiting the Biodome is 0.47, visiting La Grande Roue de Montreal is 0.35 and visiting both is 0.18. Find the probability that a randomly selected tourist visits

   a. [2 Marks] the Biodome or La Grande Roue de Montreal or both.

   b. [2 Marks] neither attraction.

   c. [2 Marks] one, but not both, attraction.

3. The breakdown of students enrolled at Dawson College by year and academic major is shown in the following contingency table:

	Science	Social Science	Arts
1st year	1100	1200	1400
2nd year	1000	1300	1500

   a. [2 Marks] Find the probability that a randomly selected student is a social science student.

   b. [2 Marks] Given the person is a 2nd year student, find the probability that a randomly selected person is from Social Science.

   c. [2 Marks] Given the person is from Social Science, find the probability that a randomly selected person is a 2nd year student.

   d. [2 Marks] Are the events “Science major” and “Social Science major” complementary? If not, what is the relationship between the events?

4. a. [2 Marks] A province uses license plates that are composed of a 4-capital letter sequence followed by a 3-digit sequence with repetitions of letters and digits allowed. Find the number of distinct license plates.

   b. [2 Marks] Another province uses license plates that are composed of 6 slots. A letter or a digit can be used for each slot with repetitions of letters and digits allowed. Find the number of distinct license plates. Which province has more distinct license plates?

5. a. [2 Marks] Dawson Student Union needs to choose 3 students from a list of 35 students to fill the positions of chairperson, treasurer and secretary in a committee. Find the number of different ways to form this committee.

   b. [2 Marks] Dawson Student Union needs to choose 3 students from a list of 35 students to form a committee. Find the number of different ways to form this committee.

6. 35% of the students attend section 1 of a statistics course, 40% attend section 2 and the rest attend section 3. 70%, 65% and 90% of the students pass the course in section 1, section 2 and section 3 respectively.

   a. [2 Marks] Find the proportion of students failing this statistics course.

   b. [2 Marks] Given that a randomly chosen student fails the course, what is the probability that the student attends section 2?

7. [4 Marks] Consider the Monty Hall problem. Instead of 3 doors, we have 4 doors. Behind one door is the car and behind the other 3 doors are goats. The contestant picks one door and the host, who knows what is behind each door, opens 2 doors to reveal 2 goats. Find the probability of winning the car if the contestant switches to the other door after revealing 2 goats.

8. Consider a game when 4 fair coins are tossed.

   a. [2 Marks] List the sample space.

   b. [5 Marks] A person can win $10 if 0 or 1 head was tossed, win $100 if 2 or 3 heads were tossed and win $1000 if 4 heads were tossed. Construct the probability distribution and find the standard deviation of the distribution.

9. 29% of Dawson students use iPhone. A sample of 17 students is selected.

    a. [2 Marks] Find the probability that the number of students using iPhone is exactly 2.

    b. [3 Marks] Find the probability that the number of students using iPhone is more than 2.

    c. [2 Marks] How many Dawson students are expected to use iPhone?

10. The grades on a statistics midterm test are normally distributed with a mean of 70 and a standard deviation of 10.

    a. [3 Marks] What proportion of the class has a midterm grade of less than 74.5?

    b. [3 Marks] What is the probability that a random sample of 36 students has an average that is less than 74.5?

11. [3 Marks] Scores on a statistics test are normally distributed. The standard deviation of the distribution is 5.0, and the twenty-second percentile for the test is 72. Find the mean score for this test.

12. [5 Marks] The Dawson Teacher Union claims, with 90% confidence, more than 60% of the teachers are in favor of Gianluca as the chair. A random sample of 150 teachers is selected and 99 are in favor. Test the claim.

13. A professor claims that the students at Dawson College score at least an average of 85 on a statistics exam. A random sample of exam scores yields 83, 83, 78, 87, 80, 82 and 88. Assume the exam results are normally distributed.

    a. [6 Marks] Complete a hypothesis test using $\alpha = 0.05$.

    b. [3 Marks] Also, construct a 95% confidence interval for the true mean exam score.

14. [5 Marks] A website claims that the mean prices of two different cellphone cases are different. Using the following random sample to test the claim using $\alpha = 0.01$.

Brand	*Sample size*	*Sample mean*	*Population Standard Deviation*
A	100	\$20	\$5
B	80	\$23	\$8

Answers:

1. a. 0.24 b. No c. 0.8 d. 0.66

2. a. 0.64 b. 0.36 c. 0.46

3. a. 1/3 b. 13/38 c. 13/25 d. No, mutually exclusive

4. a. 456976000 b. 2176782336

5. a. 39270 b. 6545

6. a. 0.27 b. 14/27

7. 0.75

8. {HHHH}, {HHHT}, {HHTH}, {HHTT}
   {HTHH}, {HTHT}, {HTTH}, {HTTT}
   {THHH}, {THHT}, {THTH}, {THTT}
   {TTHH}, {TTHT}, {TTTH}, {TTTT}

x	P(x)
10	5/16
100	10/16
1000	1/16

   $\sigma = 228.8345$

9. a. 0.0672 b. 0.9093 c. 4.93

10. a. 0.6736 b. 0.9965

11. 75.85

12. $z_0 = 1.5 > 1.28$ H_0 is rejected and claim is true.

13. $t_0 = -1.4868 > -1.943$ H_0 is not rejected and claim is true.
    [79.7083, 86.2917]

14. $z_0 = -2.9277 < -2.57$ H_0 is rejected and claim is true.