

**QUEENS COLLEGE
DEPARTMENT OF MATHEMATICS**

Mathematics 110

**Final Examination
2 ½ Hours**

Fall 2017

Instructions: Answer all questions. Show all work.

1. A random sample of test scores for an accounting exam are listed below:

55 89 80 66 95 100 75 42 66 34 85 81
92 72 100 59 78 77 88 48 82 98 69 90

- (a) Identify the median, and the first and third quartiles.
(b) Identify the mode and calculate the range for this sample.
(c) Find the sample mean and sample standard deviation.
(d) Construct a histogram with the first class interval of 30 – 39.

2. In a district with five schools, the student population for each school is listed below:

School	A	B	C	D	E
Student Population	3,331	3,969	2,684	3,195	4,276

The district recently received 165 new tablets for academic use and would like to apportion them to the schools based on their student populations.

- (a) Apportion the new tablets using Hamilton’s Method.
(b) Apportion the new tablets using Lowndes’ Method.
(c) Apportion the new tablets using Jefferson’s Method.

3. A footwear manufacturer is conducting thousands of trials for a new type of hiking sneaker. It is known that 6.5% of hikers wearing these shoes will experience foot pain after one hour. If 763 hikers wearing these shoes are randomly selected, approximate the probability that;

- (a) Exactly 53 will experience foot pain.
(b) At most 40 will experience foot pain.
(c) The number of people who experience foot pain is between 43 and 55.

4. A local horror film society is deciding on which movie to show at its annual Halloween party. The society’s preference rankings for the different movies are listed below:

Number of Votes

Movie	24	17	29	11	36	13
Psycho	1 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>	5	2 <input checked="" type="checkbox"/>	4	4
Event Horizon	4	3 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>	3 <input checked="" type="checkbox"/>	3 <input checked="" type="checkbox"/>	2 <input checked="" type="checkbox"/>
The Shining	3 <input checked="" type="checkbox"/>	4	4	1 <input checked="" type="checkbox"/>	5	5
Alien	5	2 <input checked="" type="checkbox"/>	2 <input checked="" type="checkbox"/>	4	2 <input checked="" type="checkbox"/>	1 <input checked="" type="checkbox"/>
Jaws	2 <input checked="" type="checkbox"/>	5	3 <input checked="" type="checkbox"/>	5	1 <input checked="" type="checkbox"/>	3 <input checked="" type="checkbox"/>

- (a) Which movie would be selected using the plurality method?
(b) Which movie would be selected using the plurality method with a runoff between the top two movies?
(c) Which movie would be selected using Borda’s method?
(d) Which movie would be selected using the approval voting method?

5. A special die has faces marked 3-B-3-E-8-D. If the die is rolled twice, find the probability that;
- (a) Both rolls are letters.
 - (b) At least one roll is an odd number.
 - (c) The same number is rolled twice.
6. (a) Larry, Melanie, Nicole, Oscar, Paula, and Quincy are running for President of their senior class. The vote will be decided by plurality. After the first 135 votes are counted, Larry receives 12 votes, Melanie receives 9 votes, Nicole receives 14 votes, Oscar receives 26 votes, Paula receives 35 votes, and Quincy receives 39 votes. If there are 87 votes left, what is the minimal number of the remaining votes Paula needs to be assured of a win?
- (b) An election among 7 candidates is to be decided by plurality. If 948 votes are cast, what is the smallest number of votes a winning candidate can have?
7. The heights of students for an elementary school class have an approximately normal distribution with a mean of 48 inches and a standard deviation of 1.7 inches.
- (a) Find the percentage of heights between 44 inches and 50 inches.
 - (b) Find the percentage of heights above 49 inches.
 - (c) Below what height is the shortest 8.08% of the class?
 - (d) If there are 946 students in the class, how many students are shorter than 46.5 inches?
8. A lock making company has developed a new type of lock for commercial use. The lock uses a code system which requires the input of 4 digits, followed by 2 letters, followed by 2 of the following symbols (π , ∞ , σ , μ). Repetition of digits is allowed, but letters and symbols may not be repeated.
- (a) How many different codes are possible?
 - (b) How many different codes beginning with a "4" are possible?
9. Lisa found a box containing 20 different books. She wants to read 7 of them this year.
- (a) How many different lists of 7 books can Lisa choose to read?
 - (b) If the books are to be listed in a preferred reading order, how many different lists of 7 books can Lisa choose to read?