

[exam review]

permutations

1. A Canadian postal code consists of 6 characters: 3 letters alternating with 3 digits. Repetition of characters is permitted.
 - a. How many possible codes can be formed if all 10 digits and all 26 letters are used?
 - b. How many postal codes can be formed if the number of 0 and the letter O and I cannot be used.
 - c. The United States uses 5 numbers to form a zip code (eg 90210). How many possible codes can be formed using all 10 available digits.
2. Using the letters of the word "FIELD"
 - a. How many different 5 letter words can be formed?
 - b. How many 5 letter words begin with F?
 - c. How many 5 letter words begin with a vowel?
 - d. How many 5 letter words begin with a constant?
 - e. How many 5 letter words begin and end with a vowel?
 - f. How many 5 letter words will have the vowels together?
 - g. How many 5 letter words have the vowels apart?
 - h. How many 5 letter words will have the consonants together?
3. Six friends sit down to dinner around a circular table. Ross and Rachel are dating but don't want anyone to know yet. How many different ways can the 6 friends be seated so that Ross and Rachel do not sit beside each other?
4. A baseball team has 9 players and each player has to bat. Find the number of possible batting orders for each of the following conditions:

- a. No restrictions
 - b. The pitcher must bat last.
 - c. The 2nd baseman and the shortstop are twins and cannot be distinguished from each other.
 - d. The 2nd and 3rd basemen must bat after each other (ie the batting order must have the 2nd baseman followed by the 3rd baseman or the 3rd baseman followed by the 2nd baseman).
5. How many ways can the letters of the word SASKATCHEWAN be arranged?

combinations

1. Find the value of n such that ${}_nC_2 = 28$ where $n \in \mathbb{N}$.
2. If $X = \{1, 3, 5, 7, 9\}$ find the number of subsets of X that have only 2 elements.
3. How many ways can a jury of 12 people be formed from 16 people if 3 of the people are women and at least 1 woman must be on the jury?
4. A survey of 35 blind dates showed: 20 were blondes, 17 had a great personality, 12 were blondes that had a great personality. How many blind dates were only cute?
5. A package of 20 pens contain 15 that work and 5 that do not work. In how many ways can 5 pens be selected so that at least 5 work?
6. At Tony's Palace of Pizza and Bowling Alley they can serve you any one of 127 different pizzas (not counting plain). How many different toppings are there to choose from.

binomial theorem

1. Expand the following using the Binomial Theorem: $\left(2x^2 - \frac{1}{x}\right)^6$
2. For the expansion of $(3x + x^2)^8$
 - a. The general term
 - b. The coefficient of x^{12}
3. Find the coefficient of x^2 in the expansion of $(x^2 + 2)^8(x - 1)^6$

probability theory

1. You roll a pair of dice. Find the probability of each of the following:
 - a. A sum of 8
 - b. A sum < 8
 - c. A sum of 1
2. You roll a pair of dice. Find the probabilities of the following:
 - a. A sum ≤ 8 if the first die is 4
 - b. A sum ≤ 8 given that either die is a 4
3. A survey found that 35% of blind dates were described as having a great personality and 20% were described as cute. Only 2 of 25 blind dates surveyed had a great personality **and** were cute.
 - a. Find the probability your next blind date is either cute or has a great personality.
 - b. Find the probability that your next blind date has a great personality given that the date is cute.
4. From a Data Management class of 20 students (20 girls and 8 boys) and 1 teacher a committee of 4 people is to be formed to set testing policy. Find the probabilities:
 - a. That all boys will be on the committee.
 - b. That 2 girls, 1 boy, and the teacher are on the committee.
 - c. That at least 1 girl is on the committee.
5. On a math test the probability that Matt E Matics gets a question right is 0.50. However, each time Matt gets a question right, his confidence grows and the probability that he gets the next question right increases by 0.10, but each time he gets a question wrong his probability of getting the next question right decreases by 0.10.
 - a. Draw a tree diagram showing the possible outcomes and the probabilities for the first 3 questions.
 - b. Find the probability that Matt gets 2 right out of the first 3 questions.
 - c. Find the probability that Matt gets at least 2 questions right out of the first 3 questions.

probability distributions

1. For a game, a bag contains 4 red, 3 blue, 2 green, and 1 gold ball. You take out a ball. If the ball is red, you win \$5, blue \$10, green \$25, and gold \$100. If you pay \$15 to play the game:
 - a. Find the expected value of the game.
 - b. Is this a fair game?
 - c. If you play the game 10 times, what net profit/loss can you expect?

normal distribution

1. It is found that 5.59% of the cars passing through a photo radar trap are going less than 100 km/h while 10.75% of the cars are going faster than 110 km/h. If the speeds of the cars follow a normal distribution, find the mean and standard deviation of the car's speeds.

statistics

1. Following some social media reports that Chocomunchie has been shorting their chocolate bars (ie make them lighter than they should be), you decide to buy and weigh 70 of the bars. The results are as follows:

Weight (g)	Frequency	Midpoint	Fx	Fx ²
85.5-90.5	1			
90.5-95.5	2			
95.5-100.5	7			
100.5-105.5	44			
105.5-110.5	15			
110.5-115.5	1			

- a. Find the mean.
- b. Find the standard deviation.
- c. Based on your 70 test bars, what percent of the Chocomunchie bars weight less than 100 g?