

**Finite Mathematics; Quiz 0**

1. Print your name. You must print it legibly.
2. What is your year in school and your (probable) major ?
3. Why are you taking this course ?
4. What is Mathematics and why do we study it ?
5. Do you have math anxiety, and, if so, what do you plan on doing about it ?
6. What grade do you honestly expect to get from this class ? Why ?

0. Print your name: \_\_\_\_\_

1. Use a Venn diagram to determine whether or not the following is a valid syllogism:  
Islands are surrounded by water.  
No man is an island.  
Therefore, no man is surrounded by water.

2. State the contrapositive of “If you are homeless then you are unemployed.”

3. Use a truth table to determine when if ever the wff  $(p \wedge \neg p) \rightarrow q$  is true ?

0. Print your name: \_\_\_\_\_

1. Suppose  $A$  and  $B$  are sets, inside a “universal” set  $U$ , with  $A \cap B \neq \emptyset$ , and with neither  $A$  nor  $B$  contained in the other. Draw a Venn diagram and shade in the region  $A^c \cap B$ .

2. List all the subsets of the set  $X = \{c, o, w\}$

3. How many (5 card) poker hands are straights (five cards in sequence) ? You may include straight flushes (five cards in sequence all of the same suit) in your count.

0. Print your name: \_\_\_\_\_

1. Your five-year-old has six magnets labelled with the letters: A, B, C, D, F, and W. How many 4-letter "words" can he make using these magnets ? (Note- the "words" formed will probably not be real ones.)

2. Show that in poker there are 36 straight flushes (five cards that are both in sequence and are of the same suit).

3. How many poker hands are flushes (five cards of the same suit but not in sequence) ?  
[Hint- problem #2 may help here.]

0. Print your name: \_\_\_\_\_

1. What is the probability of drawing a king or a spade from a deck of cards ? Explain your answer.

2. What is the probability of getting exactly one head when you flip a coin three times ? What are the odds against doing so ?

3. The horse Lucky Rider has odds of 11 to 3 against winning the race. What is the probability of Lucky Rider winning the race ?

0. Print your name: \_\_\_\_\_

1. You roll 2 dice. What is the probability that the total on the two dice is at least ten ?

2. In the the 6/49 Lotto game, first prize is obtained by getting all 6 numbers right while second prize is obtained by getting exactly 5 numbers right. What is the probability of winning second prize ?

3. Our class opens up a casino. We design a game where a player flips a coin three times – paying one dollar to make those three flips. We pay him two dollars provided he gets two heads in a row (i.e., his initial dollar back plus one more dollar). If the game is played 1000 times each day, on the average how much should our casino make per day ?

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1. You pay a dollar and roll two dice. If the sum is at least ten you're paid five dollars (for a net gain of four). Otherwise you lose. What is the expected value of playing this game ?

2. Suppose a winning Lotto ticket in a 6/49 game is worth \$ 20 million. Assume that duplicate winning tickets each get the prize without having to share. Find the expected value of a ticket. [Note: in real life they actually have to share, but that would make our calculation too hard.]

3. You draw one card from a deck of cards. Let  $E$  be the event "the card is an ace", and  $F$  be the event "the card is a spade". Compute  $P(E \cap F)$ ,  $P(E|F)$ , and  $P(F|E)$ .

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1. Make up a relative frequency histogram for the data set  $\{1, 2, 2, 2, 3, 3, 3, 3, 3, 4\}$

2. Joe has received the grades of 55% and 66% on his first two exams. What does he have to score on his third exam in order to have a mean score of at least 70%. Can he end up with a mean score of 80% ? [Note: no exam grades are dropped here.]

3. Compute the mean, median, and mode of  $\{0, 0, 1, 1, 1, 1, 2, 9, 19, 20, 23, 55, 55, 60, 80\}$

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1. Compute the mean and the standard deviation of the data:  $\{7, 8, 9, 5, 6, 7, 7, 4, 5\}$

2. A data set has a frequency histogram with three bars, one at  $x = 4$  with height 3, another at  $x = 6$  with height 10, and one at  $x = 9$  with height 5. Find the mean and standard deviation of the data set.

3. Suppose the data set A has mean 75 and standard deviation 5 while B has mean 75 and standard deviation 20. On a single graph, sketch a possible relative density frequency histogram for A and a possible relative density frequency histogram for B. (Be sure to label the graph.)

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1. What does the central limit theorem say about using samples to estimate a mean ?

2. Find  $P(-1.6 < Z < 2.32)$ , where  $Z$  is a standard normal distribution.

3. Suppose  $X$  is  $N(25, 3.5)$ . Find  $P(20 < X < 27.5)$ .

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1. What is the MOE ? How and why is it used ?

2. What happens to the MOE as the sample size or confidence level changes ?

3. A survey of 1025 people find that 80% love math. Find the MOE assuming a confidence level of 90%.

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print your name

1. Suppose  $A = \begin{pmatrix} 2 & 4 & 1 \\ 0 & 2 & 6 \end{pmatrix}$  and  $B = \begin{pmatrix} -1 & \frac{1}{2} \\ -2 & 2 \\ 10 & 5 \end{pmatrix}$ . Find  $AB$ . Without multiplying again, explain why  $AB \neq BA$ .

2. Suppose market research shows that each year 75% of people who use brand X keep using brand X, while the rest switch to brand Y. And 60% of those who use brand Y keep using brand Y, with the remainder switching to brand X. Find the transition matrix. Suppose the market share is split evenly. What will the market breakdown be two years later ?

3. Rewrite the system of equations  $\begin{matrix} 2x + 3y = 17 \\ 4x + 5y = 39 \end{matrix}$  using matrices.