

Learning Objectives

L01 Set Concepts and Subsets (2.1, 2.2)

1. Indicate sets by the description method, roster method, and by using set builder notation.
2. Determine if a set is well defined.
3. Determine if a set is finite or infinite.
4. Determine if sets are equal, equivalent, or neither.
5. Find the cardinal number of a set.
6. Determine if a set is equal to the empty set.
7. Use the proper notation for the empty set.
8. Give an example of a universal set and list all of its subsets and all of its proper subsets.
9. Properly use notation for element, subset, and proper subset.
10. Determine if a number represents a cardinal number or an ordinal number.
11. Be able to determine the number of subsets and proper subsets that can be formed from a universal set without listing them.

L02 Venn Diagrams and Set Operations (2.3, 2.4)

1. Determine if sets are disjoint.
2. Find the complement of a set
3. Find the intersection of two sets.
4. Find the union of two sets.
5. Find the difference of two sets.
6. Apply several set operations involved in a statement.
7. Determine sets from a Venn diagram.
8. Use the formula that yields the cardinal number of a union.
9. Construct a Venn diagram given two sets.
10. Construct a Venn diagram given three sets.

L03 Equality of Sets; Applications of Sets (2.4, 2.5)

1. Determine if set statements are equal by using Venn diagrams or DeMorgan's laws.
2. Write a description of the different regions of a Venn diagram.
3. Construct a Venn diagram from a real-life problem.
4. Apply set statements to a real-life problem.

L04 Statements & Logical Connectives; Truth Tables (3.1, 3.2)

1. Determine if a compound statement is a negation, conjunction, disjunction, conditional, or biconditional.
2. Write a compound statement given in words in symbolic form.
3. Write a compound statement given in symbolic form into words.
4. Write the negation of a statement.
5. Apply dominance rules if no parentheses or commas are used in the compound statement.

6. Construct a truth table for a negation.
7. Construct a truth table for a conjunction.
8. Construct a truth table for a disjunction.
9. Construct a truth table for a compound statement involving negations, conjunctions, and disjunctions.
10. Use the truth values of simple statements to determine if the compound statement is true.

L05 More on Truth Tables; Equivalent Statements (3.3, 3.4)

1. Construct a truth table for a conditional.
2. Construct a truth table for a biconditional.
3. Construct a truth table for a compound statement involving negations, conjunctions, disjunctions, conditionals, and biconditionals.
4. Determine if a compound statement is a tautology
5. Determine if a compound statement is a self-contradiction.
6. Determine if a compound statement is an implication.
7. Use the truth values of simple statements to determine if the compound statement is true.
8. Use De Morgan's laws to determine if statements are equivalent.
9. Use a truth table to determine if statements are equivalent.
10. Rewrite a conjunction using De Morgan's laws.
11. Rewrite a disjunction using De Morgan's laws.
12. Rewrite a conditional as a disjunction.
13. Rewrite a conditional as a disjunction, then rewrite it using De Morgan's laws.
14. Define and work with variations of the conditional statement - converse, inverse, and contrapositive of the conditional.
15. Determine if statements are equivalent.

L06 Symbolic Arguments and Euler Diagrams (3.5, 3.6)

1. Determine if an argument is valid by using a truth table.
2. Find a valid conclusion for an argument.
3. Determine if an argument is valid by constructing an Euler diagram.
4. Determine whether to use a truth table or an Euler diagram to determine if an argument is valid.

L07 Number Theory; the Integers (5.1, 5.2)

1. Apply the divisibility rules for 2, 3, 4, 5, 6, 8, 9, and 10.
2. Find the prime factorization of a number.
3. Find the greatest common divisor using any of the three methods given in lecture (listing the divisors, using the prime factorization, and the Euclidean algorithm).
4. Find the least common multiple using any of the three methods given in lecture (listing the multiples, using the prime factorization, and using the theorem).
5. Determine if numbers are relatively prime.
6. Add, subtract, multiply, and divide integers.

L08 Rational, Irrational, and Real Numbers (5.3, 5.4)

1. Reduce fractions.
2. Add, subtract, multiply, and divide fractions.
3. Add, subtract, multiply, and divide mixed numbers.
4. Express terminating decimals as the quotient of two integers.
5. Express repeating decimals as the quotient of two integers.
6. Find a rational number between two rational numbers.
7. Simplify radicals.
8. Add, subtract, multiply, and divide irrational numbers.
9. Rationalize the denominator.
10. Identify whole numbers, natural numbers, integers, rational numbers, and irrational numbers.

L09 Real Numbers and Exponents (5.5, 5.6)

1. Determine if the closure property holds for different types of numbers.
2. Illustrate the commutative property.
3. Illustrate the associative property.
4. Illustrate the distributive property.
5. Apply the rules of exponents.
6. Convert numbers to scientific notation.
7. Perform operations with numbers in scientific notation.

L10 Empirical and Theoretical Probabilities (12.1, 12.2)

1. Calculate the empirical probability of an experiment.
2. Explain the concept of law of large numbers.
3. Calculate the theoretical probability of an experiment.
4. Explain the difference between empirical and theoretical probability.
5. Calculate the probability using the complement formula for a single stage experiment.

L11 Odds; Expected Value (12.3, 12.4)

1. Calculate the odds in favor.
2. Calculate the odds against.
3. Calculate the probability given the odds.
4. Calculate the expected value.
5. Find the fair price.

L12 Tree Diagrams; Or and And Problems (12.5, 12.6)

1. Construct a tree diagram.
2. Apply the multiplication formula to multistage experiments.
3. Use the complement formula for multistage experiments.
4. Determine if events are dependent or independent.

L13 Conditional Probability; Counting Principle & Permutations (12.7, 12.8)

1. Calculate the conditional probability.
2. Apply the counting principle.
3. Apply the permutation formula.
4. Calculate the permutations of duplicate items.

L14 Combinations (12.9)

1. Apply the combination formula.
2. Apply the counting principle and either the combination formula or the permutation formula when need on certain problems.

L15 Probability Problems and Combinations (12.10)

1. Solve probability problems using the combination formula.

L16 Statistics (13.1 – 13.3)

1. Give an example of how statistics can be misleading.
2. Give an example of the different types of sampling – random, systematic, cluster, stratified, and convenience.
3. Construct a frequency distribution.
4. Calculate the width of a class.
5. Calculate the midpoint of a class.
6. Construct a histogram.
7. Construct a frequency polygon.
8. Construct a stem and leaf display.

L17 Measures of Central Tendency and Dispersion (13.4, 13.5)

1. Calculate the mean
2. Calculate the median.
3. Calculate the mode.
4. Calculate the midrange.
5. Calculate the range.
6. Calculate the standard deviation.

L18 The Normal Curve (13.6)

1. Identify the following distributions – rectangular, J-shaped, bimodal, skewed, and normal.
2. Calculate the z-score.
3. Know the empirical rule for a normal distribution.
4. Use the z-table for normal distributions.

L19 Graphing Linear Equations (6.7)

1. Plot points on the rectangular coordinate system.
2. Graph linear equations by plotting points.
3. Graph linear equations by graphing the x and y-intercepts.
4. Find the slope of a line.

L20 Systems of Linear Equations (7.1)

1. Determine if an ordered pair is a solution to a system.
2. Solve a system of linear equations by graphing.
3. Determine the break-even point.
4. Determine without graphing the number of solutions a system will have.

L21 Methods of Solving the Systems of Equations (7.2)

1. Find the solution to a system of equations using the substitution method.
2. Find the solution to a system of equations using the addition method.

L22 Linear Inequalities in Two Variables (6.8)

1. Graph an inequality.

L23 Systems of Linear Inequalities (7.5)

1. Graph a system of linear inequalities.

L24 Linear Programming (7.6):

1. Solve linear programming problems.