North Carolina CTE

Advanced Functions and Modeling (2003): Grades 9, 10, 11, 12

Adopted 2003

Data Analysis and Probability, Algebra

1. **The learner will analyze data and apply probability concepts to solve problems.**
   01. Create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, and logarithmic functions of bivariate data to solve problems. 1.01
      a. Interpret the constants, coefficients, and bases in the context of the data. 1.01.A
      b. Check models for goodness-of-fit; use the most appropriate model to draw conclusions and make predictions. 1.01.B
   02. Summarize and analyze univariate data to solve problems. 1.02
      a. Apply and compare methods of data collection. 1.02.A
      b. Apply statistical principles and methods in sample surveys. 1.02.B
      c. Determine measures of central tendency and spread. 1.02.C
      d. Recognize, define, and use the normal distribution curve. 1.02.D
      e. Interpret graphical displays of univariate data. 1.02.E
      f. Compare distributions of univariate data. 1.02.F
   03. Use theoretical and experimental probability to model and solve problems. 1.03
      a. Use addition and multiplication principles. 1.03.A
      b. Calculate and apply permutations and combinations. 1.03.B
      c. Create and use simulations for probability models. 1.03.C
      d. Find expected values and determine fairness. 1.03.D
      e. Identify and use discrete random variables to solve problems. 1.03.E
      f. Apply the Binomial Theorem. 1.03.F

2. **The learner will use functions to solve problems.**

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01. Use logarithmic (common, natural) functions to model and solve problems; justify results. 2.01
    a. Solve using tables, graphs, and algebraic properties. 2.01.A
    b. Interpret the constants, coefficients, and bases in the context of the problem. 2.01.B
02. Use piecewise-defined functions to model and solve problems; justify results. 2.02
    a. Solve using tables, graphs, and algebraic properties. 2.02.A
    b. Interpret the constants, coefficients, and bases in the context of the problem. 2.02.B
03. Use power functions to model and solve problems; justify results. 2.03
    a. Solve using tables, graphs, and algebraic properties. 2.03.A
    b. Interpret the constants, coefficients, and bases in the context of the problem. 2.03.B
04. Use trigonometric (sine, cosine) functions to model and solve problems; justify results. 2.04
    a. Solve using tables, graphs, and algebraic properties. 2.04.A
    b. Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts. 2.04.B
    c. Develop and use the law of sines and the law of cosines. 2.04.C
05. Use recursively-defined functions to model and solve problems. 2.05
    a. Find the sum of a finite sequence. 2.05.A
    b. Find the sum of an infinite sequence. 2.05.B
    c. Determine whether a given series converges or diverges. 2.05.C
    d. Translate between recursive and explicit representations. 2.05.D