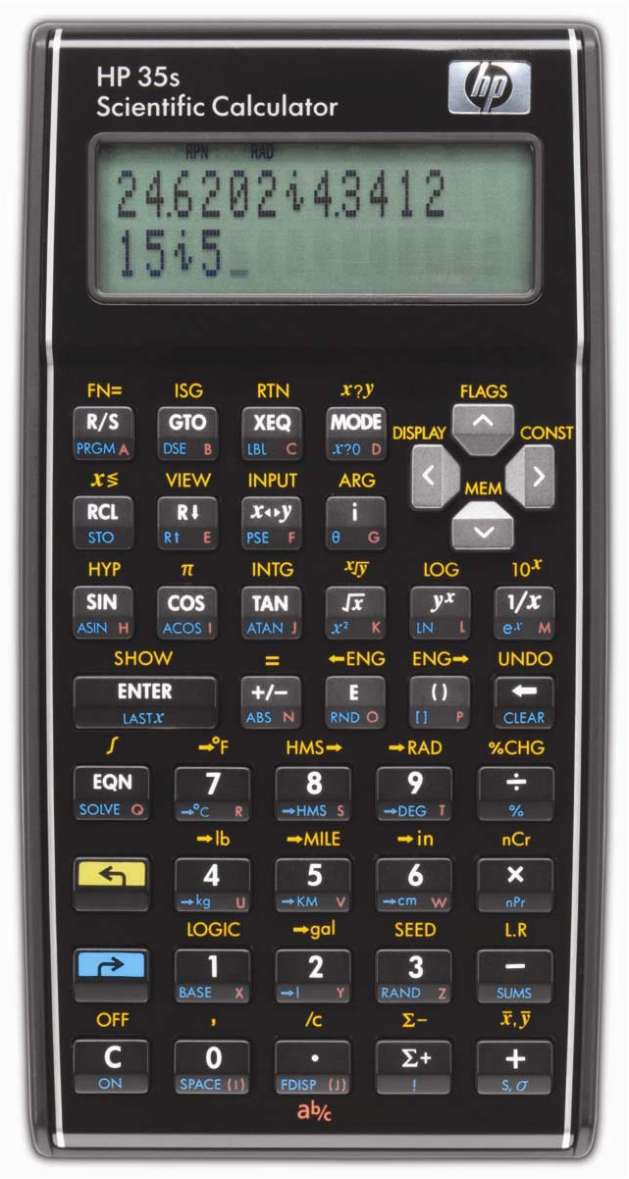
hp calculators



HP 35s Working with vectors

Vectors

Practice solving problems involving vectors

Vectors

From a mathematical point of view, a vector is an array of 2 or more elements arranged into a row or a column. Physical vectors that have two or three components and can be used to represent physical quantities such as position, velocity, acceleration, forces, moments, linear and angular momentum, angular velocity and acceleration, etc.

On the HP 35s, vectors are entered using the [↻] [ ] keystrokes. This opens an empty set of brackets to hold the values within the two dimensional or three dimensional vector. Elements of a vector are separated with a comma, which is entered by pressing [↺] [,]. The elements that can be stored in a vector cannot be complex numbers or vectors themselves. Vectors can also be used in equations.

The HP 35s can add, subtract, multiply or divide vectors. The HP 35s can also compute the magnitude of a vector using the [↻] [ABS] function.

Vectors can also be used to pack real numbers into a register to increase the storage capacity of the HP 35s (or to store the same amount of information using less space). See the separate learning module for the indirect register data packing program for more information.

To construct a vector in an equation or within a program that is composed of values found in stack or data registers, see page 10-8 of the HP 35s User's Guide.

Practice solving problems involving vectors

Example 1: Perform this vector addition: [1 , 3] + [5 , 1]

Solution: In RPN mode: [↻] [ ] 1 [↺] [,] 3 ENTER [↻] [ ] 5 [↺] [,] 1 [+]

In algebraic mode: [↻] [ ] 1 [↺] [,] 3 [▶] [+] [↻] [ ] 5 [↺] [,] 1 ENTER

Figure 1

Answer: [6 , 4]. Figure 1 shows the answer in RPN mode.

Example 2: Multiply the vector [1 , 3] by the scalar of 5

Solution: In RPN mode: [↻] [ ] 1 [↺] [,] 3 ENTER 5 [×]

In algebraic mode: [↻] [ ] 1 [↺] [,] 3 [▶] [×] 5 ENTER

Figure 2

Answer: [5 , 15]. Figure 2 shows the answer in RPN mode.

Example 3: Determine the magnitude of the vector [1 , 3].

Solution: In RPN mode: [↗] [[]] [1] [↖] [,] [3] [↗] [ABS]

In algebraic mode: [↗] [ABS] [↗] [[]] [1] [↖] [,] [3] [ENTER]

Figure 3

Answer: The magnitude is approximately 3.16, which is the length of the hypotenuse of the right triangle with sides of length 1 and 3. Figure 3 shows the answer in RPN mode.

Example 4: Determine the dot product of [1 , 3] and [3 , 1]

Solution: In RPN mode: [↗] [[]] [1] [↖] [,] [3] [ENTER] [↗] [[]] [3] [↖] [,] [1] [×]

In algebraic mode: [↗] [[]] [1] [↖] [,] [3] [×] [↗] [[]] [3] [↖] [,] [1] [ENTER]

Figure 4

Answer: The dot product is equal to 6. Figure 4 shows the answer in RPN mode.

Example 5: Construct a 3-D vector that contains the elements found in variables A, B, and C within a program.

Solution: In either mode: [↗] [PRGM] [EQN] [↗] [[]] [RCL] [A] [↖] [,] [RCL] [B] [↖] [,] [RCL] [C] [ENTER]

Figure 5

Answer: Figure 5 shows the resulting program line. This line will properly create the vector for further use.