

Useful TI-89 functions for Statics

Linear Equation Solver

Solve a system of n equations for n unknowns, useful for solving static equilibrium equations. You are allowed to use this on a test, but you must first show the system of equations you are solving and then indicate that you solved it on the calculator. To access the 'solve' command, go to F2 → solve. Then, enter the equations using the syntax in the following example:

$$\begin{aligned}0 &= x + 5y \\0 &= y - 2z \\33 &= x + y - 4z\end{aligned}$$

Type in TI-89:

$$\text{solve}(0 = x + 5 * y \text{ and } 0 = y - 2 * z \text{ and } 33 = x + y - 4 * z, \{x, y, z\})$$

This command will solve for the variables x, y, z . Be sure to enter the spaces before and after 'and'; type 'and' by using the alpha button and finding the appropriate key.

$$\text{Ans: } x = 27.5, y = -5.5, z = -2.75$$

Cross Product of Vectors

Useful for calculating moments of forces. Again, you are allowed to use this on a test as long as you show the cross-product you are solving beforehand. Cross product can be calculated using the 'crossP' command, found by going to 2nd → MATH → 4 : Matrix → L: Vector ops → 2 : crossP.

Alternatively, you can find it in the CATALOG menu. Cross-product is calculated using the syntax in the following example:

$$\begin{aligned}\bar{a} &= (8\hat{i} + 4\hat{j} + 5\hat{k}) \times (3\hat{i} - 4\hat{j} + 5\hat{k}) \\&= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 8 & 4 & 5 \\ 3 & -4 & 5 \end{vmatrix} \\&= (20 - (-20))\hat{i} - (40 - 15)\hat{j} + (-32 - 12)\hat{k} \\&= 40\hat{i} - 25\hat{j} - 44\hat{k}\end{aligned}$$

Using your TI-89 function:

$$\begin{aligned}\text{crossP}([8, 4, 5], [3, -4, 5]) \\= [40, -25, -44]\end{aligned}$$

Of course, you can always use the determinate method shown as well.

Dot Product of Vectors

Useful when projecting a force onto a line, etc. Found in the same ways as 'crossP': 2nd → MATH → 4 : Matrix → L: Vector ops → 3 : dotP, or by searching in the CATALOG menu. The syntax is the same as for 'crossP', as shown in this example:

$$\text{dotP}([8, 4, 5], [3, -4, 5]) = 33$$

Adding or Subtracting Vectors

The TI-89 can add and subtract vectors as well. Just enter them as in this example:

$$\begin{aligned}[8, 4, 5] + [3, -4, 5] \\= [11, 0, 10]\end{aligned}$$