> with(linalg);
Warning, new definition for norm
Warning, new definition for trace
[BlockDiagonal, GramSchmidt, JordanBlock, LUdecomp, QRdecomp, Wronskian, addcol,
addrow, adj, adjoint, angle, augment, backsub, band, basis, bezout, blockmatrix, charmat,
charpoly, cholesky, col, coldim, colspace, colspan, companion, concat, cond, copyinto, crossprod,
curl, definite, delcols, delrows, det, diag, diverge, dotprod, eigenvals, eigenvalues, eigenvectors,
eigenvectors, entermatrix, equal, exponential, extend, ffgausselim, fibonacci, forwardsub, frobenius,
 gausselim, gaussjord, geneqns, genmatrix, grad, hadamard, hermite, hessian, hilbert, htranspose,
ihermite, indexfunc, innerprod, intbasis, inverse, ismith, issimilar, iszero, jacobian, jordan, kernel,
laplacian, leastsqs, linsolve, matadd, matrix, minor, minpoly, mulcol, mulrow, multiply, norm,
 normalize, nullspace, orthog, permanent, pivot, potential, randmatrix, randvector, rank, ratform,
row, rowdim, rowspace, rowspan, rref, scalarmul, singularvals, smith, stack, submatrix, subvector,
sumbasis, swapcol, swaprow, sylvester, toeplitz, trace, transpose, vandermonde, vecpotent,
vecdim, vector, wronskian]

To avoid seeing all these commands when you load the "linalg" package, end the "with(linalg)" command with a COLON instead of a semicolon.

Here's one way to define a vector in Maple:

> a:=vector([2,-1,3]);

a := [2, -1, 3]

> b:=vector([4,3,-6]);

b := [4, 3, -6]

> c:=vector([-4,2,k]);

c := [-4, 2, k]

> a;

a

> op(a);

[2, -1, 3]

Here is NOT the way to multiply vectors by numbers or to add and subtract vectors:

> 3*a-2*b;
Maple has a special command to perform these operations.

\[ \text{evalm}(3 \mathbf{a} - 2 \mathbf{b}); \]

\[ \left[ -2, -9, 21 \right] \]

Dot products in Maple are easy to remember:

\[ \text{dotprod}(\mathbf{a}, \mathbf{b}); \]

\[ -13 \]

For two vectors to be orthogonal, their dot product should be zero.

\[ \text{dotprod}(\mathbf{a}, \mathbf{c}); \]

\[ -10 + 3k \]

\[ \text{solve}(\%, k); \]

\[ \frac{10}{3} \]

Here is the length of a vector in Maple.

\[ \text{norm}(\mathbf{a}, 2); \]

\[ \sqrt{14} \]

Maple has other ways to "measure" the size of a vector. Here are a few...

\[ \text{evalf}(\text{norm}(\mathbf{a}, 3)); \]

\[ 3.301927249 \]

\[ \text{evalf}(\text{norm}(\mathbf{a}, 4)); \]

\[ 3.146346284 \]
Unit vectors are important in the course. Be SURE you know how to calculate them.

\[ \text{unit} := \left[ \frac{1}{7} \sqrt{14}, -\frac{1}{14} \sqrt{14}, \frac{3}{14} \sqrt{14} \right] \]

Here is how Maple calculates the angle between two vectors.

\[ \pi - \arccos \left( \frac{13}{854} \sqrt{14 \sqrt{61}} \right) \]

This answer, of course, is in radians. Here is one way to convert it to degrees.

\[ \text{convert}(\%, \text{degrees}); \]

Finally, here is how to calculate the component of \(b\) in the direction of \(a\) [this is a SCALAR].

\[ \text{comp} := \text{dotprod}(a, b) / \text{norm}(a, 2); \]

\[ \text{comp} := -\frac{13}{14} \sqrt{14} \]
Be sure you also know how to compute the vector projection of \( \mathbf{b} \) onto \( \mathbf{a} \).