Mathematica Labs | Denis Shubleka

Subject: Calculus

Topic: Cross Product

Goal: Use *Mathematica* to explore the operation of cross product.

Task 1

The command Cross[vector1, vector2] computes the cross product. Try the following:

```
Cross[{u1, u2, u3}, {v1, v2, v3}]
```

If the vectors are going to be used for additional computations, it may be a good idea to define them:

```
u = {u1, u2, u3};
v = {v1, v2, v3};
```

And then define the cross product as a new vector:

```
w = Cross[u, v]
```

Another way to compute the cross product is by using the × symbol, found in the Writing Assistant (under Typesetting, third tab, second operation). Verify that the operation is in fact the same:

```
u × v
```

Task 2

a) Use *Mathematica* to compute the sine of the angle between the vector u = <2, -1, 1> and v = <3, 2, 1>.

b) Use the dot product definition to compute the cosine of the angle.

c) Does the sum of the squares of your answers above equal 1?

d) Use the dot product operation to verify that the cross product is orthogonal
to the given vectors u and v.

Related Exercises/Notes:
