**Basic Operations**

Addition:

Subtraction:

Scalar Multiplication

**Magnitude & Direction**

2 Dimensions

3 Dimensions

*n* Dimensions

**Normalization -** *Process of finding a unit vector in the same direction as a given vector*

Unit vector in direction of

Normalize =

Magnitude

Verify unit vector of u is 1

**Zero Vector** =

Magnitude of 0 Vector is 0

Cannot be normalized, has no direction

**Dot Products**

*Inner product*: angle between 2 vectors

Solve for the angle using inverse function

=

Shorter formula:

Angle between 2 vectors:

Same direction: = 1

= 0 & radians, 0 degrees

Opposite direction: = -1

= , 180 degrees

Right angle: = 0

= , 90 degrees

Of a vector: = 1