

Elementary Statics

Equation Sheet #1: Trigonometry, Two Dimensional Vectors

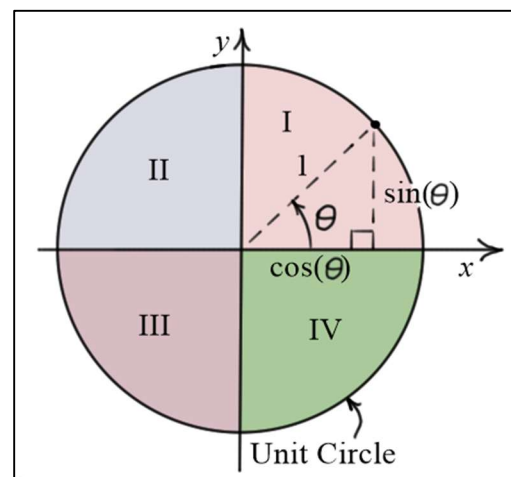
Trigonometry:

1. Right triangles:

$$r^2 = x^2 + y^2 \quad \sin(\theta) = (y/r) \quad \cos(\theta) = (x/r) \quad \tan(\theta) = (y/x)$$

2. Trigonometric function values for commonly used angles

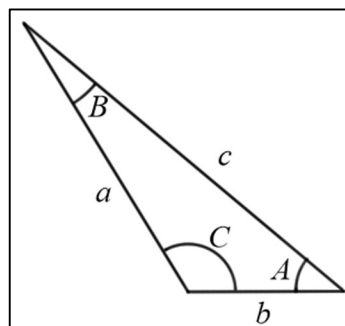
	0	30°	45°	60°	90°
$\sin(\theta)$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos(\theta)$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0



3. Non-right Triangles:

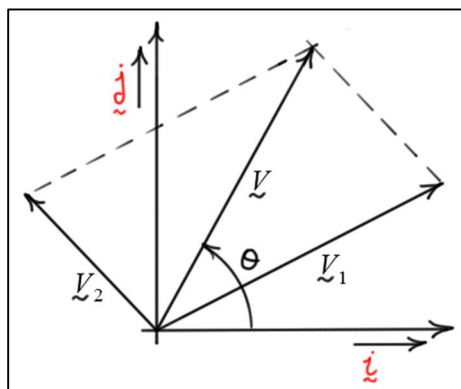
Law of Sines:
$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

Law of Cosines:
$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos(A) \\ b^2 &= a^2 + c^2 - 2ac \cos(B) \\ c^2 &= a^2 + b^2 - 2ab \cos(C) \end{aligned}$$



Two Dimensional (2D) Vectors:

1. Parallelogram Law of Addition: $\vec{V} = \vec{V}_1 + \vec{V}_2$



2. 2D vector components: $\vec{V} = \vec{V}_x + \vec{V}_y = (V \cos(\theta))\vec{i} + (V \sin(\theta))\vec{j}$

3. 2D vector magnitude/direction: $|\vec{V}| = \sqrt{V_x^2 + V_y^2}$; $\theta = \tan^{-1}(V_y/V_x)$

4. 2D vector addition: $\vec{V} = \vec{V}_1 + \vec{V}_2 = (V_{1x} + V_{2x})\vec{i} + (V_{1y} + V_{2y})\vec{j}$

