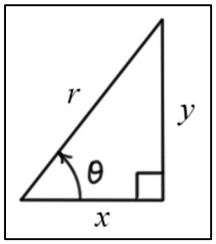
Elementary Engineering Mathematics
Equation Sheet #1 – Algebra/Trigonometry

Lines:

1. Slope of a line between two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$: $\boxed{m = \dfrac{y_2 - y_1}{x_2 - x_1}}$
2. A line through $P_1(x_1, y_1)$ with slope *m* (point-slope form): $\boxed{y - y_1 = m(x - x_1)}$
3. A line with *y*-intercept *b* and slope *m* (slope-intercept form): $\boxed{y = m\,x + b}$

Quadratics:

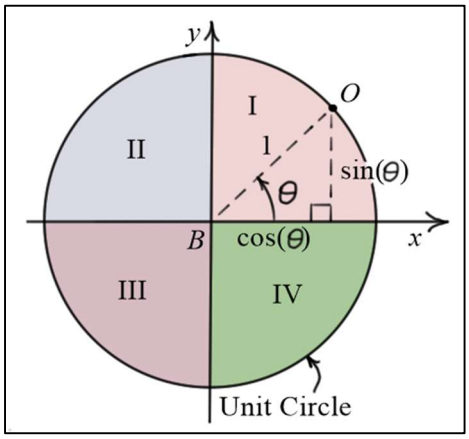
1. Quadratic formula for finding roots. If $\boxed{y(x) = a\,x^2 + b\,x + c = 0}$, then $\boxed{x_{1,2} = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$
2. Completing the square: $\boxed{\begin{aligned} y(x) &= x^2 + 2a\,x + b = (x + a)^2 + (b - a^2) \\ y(x) &= x^2 - 2a\,x + b = (x - a)^2 + (b - a^2) \end{aligned}}$
3. Factoring: $\boxed{y(x) = (x + a)(x + b) = x^2 + (a + b)x + (ab)}$



Trigonometry:

1. Right triangles:
   $\boxed{r^2 = x^2 + y^2}$ $\boxed{\sin(\theta) = (y/r)}$ $\boxed{\cos(\theta) = (x/r)}$ $\boxed{\tan(\theta) = (y/x)}$
2. Trigonometric function values for commonly used angles

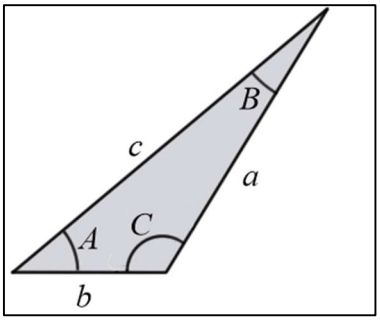
	0	30°	45°	60°	90°
$\sin(\theta)$	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
$\cos(\theta)$	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0



3. Non-right Triangles:

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

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



4. Useful Trigonometric identities:

$\boxed{\begin{aligned} \sin^2(\theta) + \cos^2(\theta) &= 1 \\ \sin(2\theta) &= 2\sin(\theta)\cos(\theta) \\ \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta) \end{aligned}}$

$\boxed{\begin{aligned} \sin(\theta + \phi) &= \sin(\theta)\cos(\phi) + \cos(\theta)\sin(\phi) \\ \cos(\theta + \phi) &= \cos(\theta)\cos(\phi) - \sin(\theta)\sin(\phi) \end{aligned}}$