Useful Equations

$$\frac{sin\alpha}{A} = \frac{sin\beta}{B} = \frac{sin\gamma}{C} \qquad C^2 = A^2 + B^2 - 2ABcos\gamma$$

$$\left|\vec{R}\right| = \sqrt{R_x^2 + R_y^2 + R_z^2} \qquad \hat{u} = \frac{\vec{R}}{\left|\vec{R}\right|} \qquad \vec{A}\cdot\vec{B} = \left|\vec{A}\right|\left|\vec{B}\right|\cos\theta = A_xB_x + A_yB_y + A_zB_z$$

$$cos\alpha = \frac{A_x}{A} \qquad cos\beta = \frac{A_y}{A} \qquad cos\gamma = \frac{A_z}{A}$$

$$\vec{M}_{Couple} = \vec{d}_{\perp} \times \vec{F} \qquad \vec{M}_O = \vec{R}_{OF} \times \vec{F} = \begin{vmatrix} i & j & k \\ R_x & R_y & R_z \\ F_x & F_y & F_z \end{vmatrix} \qquad M_u = \hat{u}\cdot\left(\vec{R}_{OF} \times \vec{F}\right) = \begin{vmatrix} u_x & u_x & u_x \\ R_x & R_y & R_z \\ F_x & F_y & F_z \end{vmatrix}$$

$$\vec{F} = \vec{F}_{\parallel} + \vec{F}_{\perp} \qquad \sum \vec{F}_i = 0 \qquad \sum \vec{M}_{Oi} = 0$$

$$W = \int w(x)\,dx \qquad \bar{x} = \frac{\int x\, w(x)\,dx}{W}$$