

$$C=\sqrt{A^2+B^2-2ABcos(c)}$$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$\vec{A}\times\vec{B}=-\vec{B}\times\vec{A}\qquad\qquad a(\vec{A}\times\vec{B})=(a\vec{A})\times\vec{B}=(\vec{A}\times\vec{B})a=\vec{A}\times(a\vec{B})\qquad\qquad \vec{A}\times(\vec{B}+\vec{D})=\vec{A}\times\vec{B}+\vec{A}\times\vec{D}$$

$$F_x=Fcos(\alpha)\qquad F_y=Fcos(\beta)\qquad F_z=Fcos(\gamma)$$

$$F^2=F_x^2+F_y^2+F_z^2$$

$$\frac{F_x}{\cos(\alpha)}=\frac{F_y}{cos(\beta)}=\frac{F_y}{\cos(\gamma)}=F$$

$$1=\cos^2(\alpha)+\cos^2(\beta)+\cos^2(\gamma)$$

$$\vec{r}_{AB}=\vec{r}_B-\vec{r}_A=(x_B-x_A)\hat{i}+(y_B-y_A)\hat{j}+(z_B-z_A)\hat{k}$$

$$r_{AB}=\sqrt{(x_B-x_A)^2+(y_B-y_A)^2+(z_B-z_A)^2}$$

$$\widehat{U}_{AB}=\frac{(x_B-x_A)\hat{i}}{r_{AB}}+\frac{(y_B-y_A)\hat{j}}{r_{AB}}+\frac{(z_B-z_A)\hat{k}}{r_{AB}}$$

$$A_xB_x+A_yB_y+A_zB_z=\vec{A}\cdot\vec{B}=ABcos(\theta)$$

$$F=kx$$

$$\Sigma F_{x,y,z}=0$$

$$M_o = Fd$$

$$\vec{M}_o=\vec{r}\times\vec{F}=\begin{vmatrix}\hat{i}&\hat{j}&\hat{k}\\r_x&r_y&r_z\\F_x&F_y&F_z\end{vmatrix}=(r_yF_z-r_zF_y)\hat{i}-(r_xF_z-r_zF_x)\hat{j}-(r_xF_y-r_yF_x)\hat{k}$$

$$\vec{M}_a=\begin{vmatrix}U_{ax}&U_{ay}&U_{az}\\r_x&r_y&r_z\\F_x&F_y&F_z\end{vmatrix}=(r_yF_z-r_zF_y)U_{ax}-(r_xF_z-r_zF_x)U_{ay}-(r_xF_y-r_yF_x)U_{az}$$

$$\Sigma F_{x,y,z}=0$$

$$\Sigma M_{x,y,z}=0$$

$$M=2J-3$$

$$\frac{dv}{dx}=w(x)$$

$$\Delta v_{AB}=\int_A^B w(x)dx$$

$$\deg(m(x))=\deg(v(x))+1$$

$$\frac{dm}{dx}=v(x)$$

$$\Delta m_{AB}=\int_A^B v(x)dx$$

$$v_f=m_f=0$$

$$F_s=\mu_sN$$

$$F_k=\mu_kN$$

$$\bar{x}=\frac{\Sigma \tilde{x}w}{\Sigma w}$$

$$\bar{x}=\frac{\Sigma \tilde{x}V}{\Sigma V}$$

$$\bar{x}=\frac{\Sigma \tilde{x}A}{\Sigma A}$$

$$\bar{x}=\frac{\Sigma \tilde{x}L}{\Sigma L}$$

$$\bar{x}=\frac{\int \tilde{x}dw}{\int dw}$$

$$\bar{x}=\frac{\int \tilde{x}dv}{\int dv}$$

$$\bar{x}=\frac{\int \tilde{x}dA}{\int dA}$$

$$\bar{x}=\frac{\int \tilde{x}dl}{\int dl}$$

$$I_x=\int_A y^2dA$$

$$I_y=\int_A x^2dA$$

$$J_o=\int_A r^2dA$$

$$I_{xy}=\int_A xydA$$

$$I_x=\bar{I}_{x'}+A(d_y)^2$$

$$I_y=\bar{I}_{y'}+A(d_x)^2$$

$$J_o=\bar{J}_c+A(d_c)^2$$

$$I_{xy}=\bar{I}_{x'y'}+Ad_xd_y$$

$$K_x=\sqrt{\frac{I_x}{A}}$$

$$K_y=\sqrt{\frac{I_y}{A}}$$

$$I_u=\frac{I_x+I_y}{2}+\frac{I_x-I_y}{2}\cos(2\theta)-I_{xy}\sin(2\theta)$$

$$I_v=\frac{I_x+I_y}{2}-\frac{I_x-I_y}{2}\cos(2\theta)+I_{xy}\sin(2\theta)$$

$$I_{uv}=\frac{I_x-I_y}{2}\sin(2\theta)+I_{xy}\cos(2\theta)$$

$$J_o=I_u+I_v=I_x+I_y$$

$$I_x=\int_A y^2dm$$

$$I_y=\int_A x^2dm$$

$$I_G=\int_A r^2dm$$

$$I=I_G+md^2$$