OFFICIAL FORMULA SHEET

Arc Length:

$$\int_a^b |\mathbf{r}'(\mathbf{t})|\ dt$$

Distance from a point to a line, or plane

$$d = \frac{|\ Ax_0 + By_0 + C\ |}{\sqrt{A^2 + B^2}}, \quad d = \frac{|\ Ax_0 + By_0 + Cz_0 + D\ |}{\sqrt{A^2 + B^2 + C^2}}$$

Second Derivative Test:

$$B^2 - AC$$

Fluid Pressure:

$$\iint_R \rho\, g\, d\, dA$$

First Moments (2D):

$$M_x = \iint_D y\rho(x,y)\, dA, \quad M_y = \iint_D x\rho(x,y)\, dA$$

Moments of Inertia (2D):

$$I_x = \iint_D y^2\rho(x,y)\, dA, \quad I_y = \iint_D x^2\rho(x,y)\, dA$$

First Moments (3D):

$$M_{xy} = \iiint_E z\rho(x,y,z)\, dV, \quad M_{xz} = \iiint_E y\rho(x,y,z)\, dV, \quad M_{yz} = \iiint_E x\rho(x,y,z)\, dV$$

Moments of Inertia (3D):

$$I_x = \iiint_E (y^2+z^2)\rho(x,y,z)\, dV, \quad I_y = \iiint_E (x^2+z^2)\rho(x,y,z)\, dV, \quad I_z = \iiint_E (x^2+y^2)\rho(x,y,z)\, dV$$