

MA280 Formula Sheet

Polar/Cylindrical Coordinates

$$x^2 + y^2 = r^2$$

$$\tan \theta = y/x$$

$$x = r \cos \theta$$

$$y = r \sin \theta$$

$$dA = r dr d\theta$$

$$z = z$$

$$dV = r dr d\theta dz$$

Spherical Coordinates

$$x^2 + y^2 + z^2 = \rho^2$$

$$x = \rho \cos \theta \sin \phi$$

$$y = \rho \sin \theta \sin \phi$$

$$z = \rho \cos \phi$$

$$dV = \rho^2 \sin \phi d\rho d\theta d\phi$$

Surface area of $\vec{r}(u, v)$ over a region D

$$\iint_D |\vec{r}_u \times \vec{r}_v| dA$$

$$\iint_D \sqrt{1 + f_x^2 + f_y^2} dA \text{ for the surface } z = f(x, y)$$