SUMMARY OF VECTOR RELATIONS

	Cartesian Coordinates	*Cylindrical Coordinates*	*Spherical Coordinates*
Coordinate variables	x, y, z	r, ϕ, z	r, θ, ϕ
Vector representation, A =	$\hat{\mathbf{x}}A_x + \hat{\mathbf{y}}A_y + \hat{\mathbf{z}}A_z$	$\hat{\mathbf{r}}A_r + \hat{\phi}A_\phi + \hat{\mathbf{z}}A_z$	$\hat{\mathbf{r}}A_r + \hat{\theta}A_\theta + \hat{\phi}A_\phi$
Magnitude of A, |A|	$\sqrt{A_x^2 + A_y^2 + A_z^2}$	$\sqrt{A_r^2 + A_\phi^2 + A_z^2}$	$\sqrt{A_r^2 + A_\theta^2 + A_\phi^2}$
Position vector from origin to P_1, $\overrightarrow{OP_1}$ =	$\hat{\mathbf{x}}x_1 + \hat{\mathbf{y}}y_1 + \hat{\mathbf{z}}z_1$ for $P(x_1, y_1, z_1)$	$\hat{\mathbf{r}}r_1 + \hat{\mathbf{z}}z_1$ for $P(r_1, \phi_1, z_1)$	$\hat{\mathbf{r}}r_1$ for $P(r_1, \theta_1, \phi_1)$
Differential length, $d\mathbf{l}$ =	$\hat{\mathbf{x}}dx + \hat{\mathbf{y}}dy + \hat{\mathbf{z}}dz$	$\hat{\mathbf{r}}dr + \hat{\phi}r d\phi + \hat{\mathbf{z}}dz$	$\hat{\mathbf{r}}dr + \hat{\theta}r d\theta + \hat{\phi}r\sin\theta\, d\phi$
Differential surface areas	$d\mathbf{s}_x = \hat{\mathbf{x}}dydz$ $d\mathbf{s}_y = \hat{\mathbf{y}}dxdz$ $d\mathbf{s}_z = \hat{\mathbf{z}}dxdy$	$d\mathbf{s}_r = \hat{\mathbf{r}}r\,d\phi\,dz$ $d\mathbf{s}_\phi = \hat{\phi}\,drdz$ $d\mathbf{s}_z = \hat{\mathbf{z}}r\,dr\,d\phi$	$d\mathbf{s}_r = \hat{\mathbf{r}}r^2\sin\theta\, d\theta\, d\phi$ $d\mathbf{s}_\theta = \hat{\theta}r\sin\theta\, dr\,d\phi$ $d\mathbf{s}_\phi = \hat{\phi}\,r\,dr\,d\theta$
Differential volume, dv =	$dx\,dy\,dz$	$r\,dr\,d\phi\,dz$	$r^2\sin\theta\,dr\,d\phi$