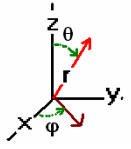
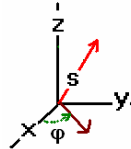


I think you'll find this useful

Spherical Coordinates		Cylindrical Coordinates	
$\vec{A} = A_r \hat{r} + A_\theta \hat{\theta} + A_\phi \hat{\phi}$		$\vec{A} = A_s \hat{s} + A_\phi \hat{\phi} + A_z \hat{z}$	
$\hat{r} = \sin(\theta) \cos(\phi) \hat{x} + \sin(\theta) \sin(\phi) \hat{y} + \cos(\theta) \hat{z}$ $\hat{\theta} = \cos(\theta) \cos(\phi) \hat{x} + \cos(\theta) \sin(\phi) \hat{y} - \sin(\theta) \hat{z}$ $\hat{\phi} = -\sin(\phi) \hat{x} + \cos(\phi) \hat{y}$		$\hat{s} = \cos(\phi) \hat{x} + \sin(\phi) \hat{y}$ $\hat{\phi} = -\sin(\phi) \hat{x} + \cos(\phi) \hat{y}$ $\hat{z} = \hat{z}$	
$\hat{x} = \sin(\theta) \cos(\phi) \hat{r} + \cos(\theta) \cos(\phi) \hat{\theta} - \sin(\phi) \hat{\phi}$ $\hat{y} = \sin(\theta) \sin(\phi) \hat{r} + \cos(\theta) \sin(\phi) \hat{\theta} + \cos(\phi) \hat{\phi}$ $\hat{z} = \cos(\theta) \hat{r} - \sin(\theta) \hat{\theta}$		$\Rightarrow \hat{y} = \hat{s} \sin(\phi) + \hat{\phi} \cos(\phi)$ $\Rightarrow \hat{x} = \hat{s} \cos(\phi) - \hat{\phi} \sin(\phi)$	
	$x = r \sin(\theta) \cos(\phi)$ $y = r \sin(\theta) \sin(\phi)$ $z = r \cos(\theta)$		$x = s \cos(\phi)$ $y = s \sin(\phi)$ $z = z$
$d\vec{A} = r^2 \sin(\theta) d\theta d\phi \hat{r}$		$d\vec{A} = s d\phi ds \hat{z}$	
$d\tau = r^2 \sin(\theta) dr d\theta d\phi$ $[r: 0 \rightarrow +\infty], [\theta: 0 \rightarrow \pi], [\phi: 0 \rightarrow 2\pi]$		$d\tau = s ds d\phi dz$ $[s: 0 \rightarrow +\infty], [\phi: 0 \rightarrow 2\pi], [z: -\infty \rightarrow +\infty]$	
$d\vec{l} = dr \hat{r} + r d\theta \hat{\theta} + r \sin(\theta) d\phi \hat{\phi}$		$d\vec{l} = ds \hat{s} + s d\phi \hat{\phi} + dz \hat{z}$	
$\vec{\nabla} T = \frac{\partial T}{\partial r} \hat{r} + \frac{1}{r} \frac{\partial T}{\partial \theta} \hat{\theta} + \frac{1}{r \sin(\theta)} \frac{\partial T}{\partial \phi} \hat{\phi}$		$\vec{\nabla} T = \frac{\partial T}{\partial s} \hat{s} + \frac{1}{s} \frac{\partial T}{\partial \phi} \hat{\phi} + \frac{\partial T}{\partial z} \hat{z}$	
$\vec{\nabla} \cdot \vec{V} = \frac{1}{r^2} \frac{\partial}{\partial r} (r^2 V_r) + \frac{1}{r \sin(\theta)} \frac{\partial}{\partial \theta} (\sin(\theta) V_\theta) + \frac{1}{r \sin(\theta)} \frac{\partial V_\phi}{\partial \phi}$		$\vec{\nabla} \cdot \vec{V} = \frac{1}{s} \frac{\partial (s V_s)}{\partial s} + \frac{1}{s} \frac{\partial V_\phi}{\partial \phi} + \frac{\partial V_z}{\partial z}$	
$\vec{\nabla} \times \vec{V} = \frac{1}{r \sin(\theta)} \left[\frac{\partial (\sin(\theta) V_\phi)}{\partial \theta} - \frac{\partial V_\theta}{\partial \phi} \right] \hat{r} + \frac{1}{r} \left[\frac{1}{\sin(\theta)} \frac{\partial V_\phi}{\partial \phi} - \frac{\partial (r V_r)}{\partial r} \right] \hat{\theta} + \frac{1}{r} \left[\frac{\partial (r V_\theta)}{\partial r} - \frac{\partial V_r}{\partial \theta} \right] \hat{\phi}$		$\vec{\nabla} \times \vec{V} = \left(\frac{1}{s} \frac{\partial V_z}{\partial \phi} - \frac{\partial V_\phi}{\partial z} \right) \hat{s} + \left(\frac{\partial V_z}{\partial z} - \frac{\partial V_s}{\partial s} \right) \hat{\phi} + \frac{1}{s} \left[\frac{\partial (s V_\phi)}{\partial s} - \frac{\partial V_s}{\partial \phi} \right] \hat{z}$	
$\vec{\nabla}^2 T = \frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial T}{\partial r} \right) + \frac{1}{r^2 \sin(\theta)} \frac{\partial}{\partial \theta} \left(\sin(\theta) \frac{\partial T}{\partial \theta} \right) + \frac{1}{r^2 \sin^2(\theta)} \frac{\partial^2 T}{\partial \phi^2}$		$\vec{\nabla}^2 T = \frac{1}{s} \frac{\partial}{\partial s} \left(s \frac{\partial T}{\partial s} \right) + \frac{1}{s^2} \frac{\partial^2 T}{\partial \phi^2} + \frac{\partial^2 T}{\partial z^2}$	

Fundamental Theorems

<p>Gradients: if $dT = (\vec{\nabla} T) \cdot d\vec{l}$ then $\int_{\text{path}}^b (\vec{\nabla} T) \cdot d\vec{l} = T(b) - T(a)$</p> <p>Corollaries:</p> <p>$\int_a^b (\vec{\nabla} T) \cdot d\vec{l}$ is path independent from a to b and $\oint (\vec{\nabla} T) \cdot d\vec{l} = 0$</p>
<p>Divergences: (Gauss's, Green's or Divergence theorem)</p> $\int_{\text{volume}} (\vec{\nabla} \cdot \vec{V}) d\tau = \oint_{\text{surface}} \vec{V} \cdot d\vec{A}$ <p>A is the area bounding the surface.</p>
<p>Curls: (Stokes' Theorem)</p> $\int_{\text{surface}} (\vec{\nabla} \times \vec{V}) \cdot d\vec{A} = \oint_{\text{path}} \vec{V} \cdot d\vec{l}$