Math 251 Multivariable Calculus Fall 2008 Equation Sheet

$$\sin^2\theta = \frac{1-\cos(2\theta)}{2} \qquad \cos^2\theta = \frac{1+\cos(2\theta)}{2}$$

$$x = r\cos\theta \qquad y = r\sin\theta$$

$$x = \rho\cos\theta\sin\phi \qquad y = \rho\sin\theta\sin\phi \qquad z = \rho\cos\phi$$

$$r\,dr\,d\theta$$

$$r\,dz\,dr\,d\theta$$

$$\rho^2\sin(\phi)\,d\rho\,d\phi\,d\theta$$

$$f_{xx}f_{yy} - f_{xy}^2 > 0 \quad \min/\max \qquad f_{xx}f_{yy} - f_{xy}^2 < 0 \quad \text{saddle}$$

$$\kappa = \left\|\frac{d\mathbf{T}}{ds}\right\| = \frac{\|\mathbf{T}'(t)\|}{\|\mathbf{r}'(t)\|} = \frac{\|\mathbf{r}'(t)\times\mathbf{r}''(t)\|}{\|\mathbf{r}'(t)\|^3}$$

$$\mathbf{a} = a_T\mathbf{T} + a_N\mathbf{N} \qquad a_T = v' \qquad a_N = \kappa v^2$$

$$\left(\frac{\mathbf{u}\cdot\mathbf{v}}{\mathbf{v}\cdot\mathbf{v}}\right)\mathbf{v}$$