CALC 203

MIDTERM EXAM FORMULA SHEET

- Assume *u & v* are the functions of *x.*

Differentiation:

$$\frac{d}{dx}\left[cu^n\right]=cnu^{n-1}\cdot u' \qquad \frac{d}{dx}\left[\ln u\right]=\frac{u'}{u} \qquad \frac{d}{dx}\left[\log_b u\right]=\frac{u'}{u\ln b} \qquad \frac{d}{dx}\left[e^u\right]=e^u\cdot u' \qquad \frac{d}{dx}\left[b^u\right]=b^u\cdot\ln b\cdot u'$$

$$\frac{d}{dx}\left[\sin u\right]=\cos u\cdot u' \qquad \frac{d}{dx}\left[\cos u\right]=-\sin u\cdot u' \qquad \frac{d}{dx}\left[\tan u\right]=\sec^2 u\cdot u' \qquad \frac{d}{dx}[\cot u]=-\csc^2 u\cdot u'$$

$$\frac{d}{dx}\left[\sec u\right]=\sec u\tan u\cdot u' \qquad \frac{d}{dx}\left[\csc u\right]=-\csc u\cot u\cdot u' \qquad \frac{d}{dx}\left[uv\right]=u'v+uv' \qquad \frac{d}{dx}\left[\frac{u}{v}\right]=\frac{u'v-uv'}{v^2}$$

Integration:

$$\int u^n du=\frac{u^{n+1}}{n+1}+C\ (n\neq -1) \qquad \int\frac{1}{u}\,du=\ln\left|u\right|+C \qquad \int e^u du=e^u+C$$

$$\int\sin u\ du=-\cos u+C \qquad \int\cos u\ du=\sin u+C \qquad \int\tan u\ du=-\ln\left|\cos u\right|+C$$

$$\int\cot u\ du=\ln\left|\sin u\right|+C \qquad \int\sec u\ du=\ln\left|\sec u+\tan u\right|+C \qquad \int\csc u\ du=\ln\left|\csc u-\cot u\right|+C$$

$$\int\sin^2 u\ du=\frac{u}{2}-\frac{\sin 2u}{4}+C \qquad \int\cos^2 u\ du=\frac{u}{2}+\frac{\sin 2u}{4}+C \qquad \int\tan^2 u\ du=\tan u-u+C$$

$$\int\cot^2 u\ du=-\cot u-u+C \qquad \int\sec^2 u\ du=\tan u+C \qquad \int\csc^2 u\ du=-\cot u+C$$

$$y_{avg}=\frac{1}{b-a}\int_a^b f(x)dx \qquad rms=\sqrt{\frac{1}{b-a}\int_a^b\left[f(x)\right]^2 dx}$$

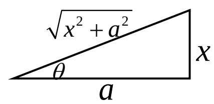
By Parts $\int u\ dv=uv-\int v\ du$

Properties of Logarithm :

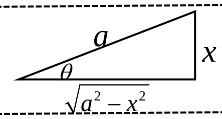
$$\ln AB = \ln A + \ln B \qquad \ln \frac{A}{B} = \ln A - \ln B \qquad \ln A^P = P \ln A$$

Trignometric Substitutiion :

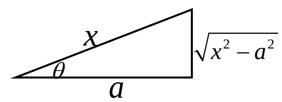
$\sqrt{x^2 + a^2}$ Let $x = a\tan\theta$, $\sqrt{x^2 + a^2} = a\sec\theta$



$\sqrt{a^2 - x^2}$ Let $x = a\sin\theta$, $\sqrt{a^2 - x^2} = a\cos\theta$



$\sqrt{x^2 - a^2}$ Let $x = a\sec\theta$, $\sqrt{x^2 - a^2} = a\tan\theta$



Trignometric Identities :

$$\sin^2\theta + \cos^2\theta = 1 \qquad 1 + \tan^2\theta = \sec^2\theta \qquad 1 + \cot^2\theta = \csc^2\theta$$

$$\sec\theta = \frac{1}{\cos\theta} \qquad \csc\theta = \frac{1}{\sin\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$