Formulas given on Exam #3
Calculus II – Summer 2005

- $\int \frac{du}{\sqrt{a^2-u^2}} = \sin^{-1}\left(\frac{u}{a}\right)+c$, $u^2 < a^2$
- $\int \frac{du}{a^2+u^2} = \frac{1}{a}\tan^{-1}\left(\frac{u}{a}\right)+c$
- $\int \frac{du}{u\sqrt{u^2-a^2}} = \frac{1}{a}\sec^{-1}\left|\frac{u}{a}\right|+c$, $u^2 > a^2$
- $\frac{d(\sin^{-1}u)}{dx} = \frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$, $|u| < 1$
- $\frac{d(\cos^{-1}u)}{dx} = \frac{-1}{\sqrt{1-u^2}}\frac{du}{dx}$, $|u| < 1$
- $\frac{d(\tan^{-1}u)}{dx} = \frac{1}{1+u^2}\frac{du}{dx}$
- $\frac{d(\cot^{-1}u)}{dx} = \frac{-1}{1+u^2}\frac{du}{dx}$
- $\frac{d(\sec^{-1}u)}{dx} = \frac{1}{|u|\sqrt{u^2-1}}\frac{du}{dx}$, $|u| > 1$
- $\frac{d(\csc^{-1}u)}{dx} = \frac{-1}{|u|\sqrt{u^2-1}}\frac{du}{dx}$, $|u| > 1$
- $\frac{d(\sinh^{-1}u)}{dx} = \frac{1}{\sqrt{1+u^2}}\frac{du}{dx}$
- $\frac{d(\cosh^{-1}u)}{dx} = \frac{1}{\sqrt{u^2-1}}\frac{du}{dx}$, $u > 1$
- $M_x = \int \tilde{y}\, dm$
- $M_y = \int \tilde{x}\, dm$
- $M = \int dm$
- $\bar{x} = \frac{M_y}{M}$
- $\bar{y} = \frac{M_x}{M}$
- $dm = \delta\, dA$
- $\frac{d(\tanh^{-1}u)}{dx} = \frac{1}{1-u^2}\frac{du}{dx}$, $|u| < 1$
- $\frac{d(\coth^{-1}u)}{dx} = \frac{1}{1-u^2}\frac{du}{dx}$, $|u| > 1$
- $\frac{d(\operatorname{sec}h^{-1}u)}{dx} = \frac{-1}{u\sqrt{1-u^2}}\frac{du}{dx}$, $0< u <1$
- $\frac{d(\operatorname{csc}h^{-1}u)}{dx} = \frac{-1}{|u|\sqrt{1+u^2}}\frac{du}{dx}$, $u \neq 0$
- $\int \frac{du}{\sqrt{a^2+u^2}} = \sinh^{-1}\left(\frac{u}{a}\right)+c$, $a > 0$
- $\int \frac{du}{\sqrt{u^2-a^2}} = \cosh^{-1}\left(\frac{u}{a}\right)+c$, $u > a > 0$
- $\int \frac{du}{a^2-u^2} = \begin{cases} \frac{1}{a}\tanh^{-1}\left(\frac{u}{a}\right)+c, & u^2 < a^2 \\ \frac{1}{a}\coth^{-1}\left(\frac{u}{a}\right)+c, & u^2 > a^2 \end{cases}$
- $\int \frac{du}{u\sqrt{a^2-u^2}} = \frac{-1}{a}\operatorname{sec}h^{-1}\left(\frac{u}{a}\right)+c$, $0 < u < a$
- $\int \frac{du}{u\sqrt{a^2+u^2}} = \frac{-1}{a}\operatorname{csc}h^{-1}\left|\frac{u}{a}\right|+c$, $u \neq 0$
- $\lim_{n\to\infty}\frac{\ln n}{n} = 0$
- $\lim_{n\to\infty}\sqrt[n]{n} = 1$
- $\lim_{n\to\infty} x^{1/n} = 1 \quad (x > 0)$
- $\lim_{n\to\infty} x^n = 0 \quad (|x| < 1)$
- $\lim_{n\to\infty}\left(1+\frac{x}{n}\right)^n = e^x$
- $\lim_{n\to\infty}\frac{x^n}{n!} = 0$