

## Handout #2 Fundamental Formulas for Integration:

$$1. \int u^n u' dx = \int u^n du = \frac{u^{n+1}}{n+1} + C \quad (n \neq -1)$$

$$2. \int \frac{1}{u} u' dx = \int \frac{1}{u} du = \ln |u| + C$$

$$3. \int a^u u' dx = \int a^u du = \frac{a^u}{\ln a} + C \quad (a > 0, a \neq 1)$$

$$4. \int \sin u u' dx = \int \sin u du = -\cos u + C$$

$$5. \int \cos u u' dx = \int \cos u du = \sin u + C$$

$$6. \int \frac{1}{\cos^2 u} u' dx = \int \frac{1}{\cos^2 u} du = \tan u + C$$

$$7. \int \frac{1}{\sin^2 u} u' dx = \int \frac{1}{\sin^2 u} du = -\cot u + C$$

$$8. \int \frac{u' dx}{u^2 + a^2} = \int \frac{du}{u^2 + a^2} = \frac{1}{a} \arctan \frac{u}{a} + C_1 = -\frac{1}{a} \operatorname{arccot} \frac{u}{a} + C_2$$

$$9. \int \frac{u' dx}{u^2 - a^2} = \int \frac{du}{u^2 - a^2} = \frac{1}{2a} \ln \left| \frac{u - a}{u + a} \right| + C$$

$$10. \int \frac{u' dx}{\sqrt{u^2 \pm a^2}} = \int \frac{du}{\sqrt{u^2 \pm a^2}} = \ln (u + \sqrt{u^2 \pm a^2}) + C$$

$$11. \int \frac{u' dx}{\sqrt{a^2 - u^2}} = \int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin \frac{u}{a} + C_1 = -\arccos \frac{u}{a} + C_2$$