

INTEGRALS YOU MUST KNOW COMING INTO MATH-204

You are expected to know these formulas. Do not depend on this as a reference sheet. You must still also know differentiation rules (chain rule, product rule, quotient rule) and integration methods (u -substitution, integration by parts, fraction decomposition).

$$1. \int du = u + c \qquad \text{because } \frac{d}{du}(u) = 1$$

$$2. \int u^n du = \frac{u^{n+1}}{n+1} + c, \quad n \neq -1 \qquad \text{because } \frac{d}{du}(u^n) = nu^{n-1}$$

$$3. \int \frac{1}{u} du = \ln|u| + c \qquad \text{because } \frac{d}{du}(\ln u) = \frac{1}{u}$$

$$4. \int e^u du = e^u + c \qquad \text{because } \frac{d}{du}(e^u) = e^u$$

$$5. \int \cos u du = \sin u + c \qquad \text{because } \frac{d}{du}(\sin u) = \cos u$$

$$6. \int \sin u du = -\cos u + c \qquad \text{because } \frac{d}{du}(\cos u) = -\sin u$$

$$7. \int \sec^2 u du = \tan u + c \qquad \text{because } \frac{d}{du}(\tan u) = \sec^2 u$$

$$8. \int \csc^2 u du = -\cot u + c \qquad \text{because } \frac{d}{du}(\cot u) = -\csc^2 u$$

$$9. \int \sec u \tan u du = \sec u + c \qquad \text{because } \frac{d}{du}(\sec u) = \sec u \tan u$$

$$10. \int \csc u \cot u du = -\csc u + c \qquad \text{because } \frac{d}{du}(\csc u) = -\csc u \cot u$$

$$11. \int \frac{1}{\sqrt{1-u^2}} du = \sin^{-1} u + c \qquad \text{because } \frac{d}{du}(\sin^{-1} u) = \frac{1}{\sqrt{1-u^2}}$$

$$12. \int \frac{1}{1+u^2} du = \tan^{-1} u + c \qquad \text{because } \frac{d}{du}(\tan^{-1} u) = \frac{1}{1+u^2}$$

$$13. \int \frac{1}{u\sqrt{u^2-1}} du = \sec^{-1} u + c \qquad \text{because } \frac{d}{du}(\sec^{-1} u) = \frac{1}{u\sqrt{u^2-1}}$$

$$14. \int \sec u du = \ln|\sec u + \tan u| + c$$

$$15. \int \csc u du = -\ln|\csc u + \cot u| + c$$