Summary of Differential Formulas and Corresponding Integrals

1. $du = \frac{du}{dx}dx$	1. $\int du = u + C$
2. $d(au) = a\,du$	2. $\int a\,du = a\int du$
3. $d(u+v) = du + dv$	3. $\int (du + dv) = \int du + \int dv$
4. $d(u^n) = nu^{n-1}\,du$	4. $\int u^n\,du = \frac{u^{n+1}}{n+1} + C, \quad n \neq -1$
5. $d(\ln u) = \frac{du}{u}$	5. $\int \frac{du}{u} = \ln\lvert u\rvert + C$
6. **a)** $d(e^u) = e^u\,du$	6. **a)** $\int e^u\,du = e^u + C$
b) $d(a^u) = a^u \ln a\,du$	**b)** $\int a^u\,du = \frac{a^u}{\ln a} + C$
7. $d(\sin u) = \cos u\,du$	7. $\int \cos u\,du = \sin u + C$
8. $d(\cos u) = -\sin u\,du$	8. $\int \sin u\,du = -\cos u + C$
9. $d(\tan u) = \sec^2 u\,du$	9. $\int \sec^2 u\,du = \tan u + C$
10. $d(\cot u) = -\csc^2 u\,du$	10. $\int \csc^2 u\,du = -\cot u + C$
11. $d(\sec u) = \sec u \tan u\,du$	11. $\int \sec u \tan u\,du = \sec u + C$
12. $d(\csc u) = -\csc u \cot u\,du$	12. $\int \csc u \cot u\,du = -\csc u + C$
13. $d(\sin^{-1} u) = \frac{du}{\sqrt{1-u^2}}$	13. and 14. $\int \frac{du}{\sqrt{1-u^2}} = \begin{cases}\sin^{-1} u + C \\ -\cos^{-1} u + C'\end{cases}$
14. $d(\cos^{-1} u) = \frac{-du}{\sqrt{1-u^2}}$	
15. $d(\tan^{-1} u) = \frac{du}{1+u^2}$	15. and 16. $\int \frac{du}{1+u^2} = \begin{cases}\tan^{-1} u + C \\ -\cot^{-1} u + C'\end{cases}$
16. $d(\cot^{-1} u) = \frac{-du}{1+u^2}$	
17. $d(\sec^{-1} u) = \frac{du}{\lvert u\rvert\sqrt{u^2-1}}$	17. and 18. $\int \frac{du}{u\sqrt{u^2-1}} = \begin{cases}\sec^{-1}\lvert u\rvert + C \\ -\csc^{-1}\lvert u\rvert +\end{cases}$
18. $d(\csc^{-1} u) = \frac{-du}{\lvert u\rvert\sqrt{u^2-1}}$	

$\int \sec u\,du = \ln\lvert \sec u + \tan u\rvert$

$\int \tan u\,du = -\ln\lvert \cos u\rvert$