Basic Rules for Derivatives

1. $[f(x) + g(x)]' = f'(x) + g'(x)$

2. $[f(x) - g(x)]' = f'(x) - g'(x)$

3. $[cf(x)]' = cf'(x)$

4. $[f(x)g(x)]' = f'(x)g(x) + f(x)g'(x)$

5. $\left[\dfrac{f(x)}{g(x)}\right]' = \dfrac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$

6. $[f(g(x))]' = f'(g(x))g'(x)$

Basic Derivatives

1. $(c)' = 0$

2. $(x)' = 1$

3. $(x^r)' = rx^{r-1}$, for any real number r

4. $(e^x)' = e^x$

5. $(a^x)' = a^x \ln a$

6. $(\ln x)' = \dfrac{1}{x}$

7. $(\ln |x|)' = \dfrac{1}{x}$

8. $(\log_a x)' = \dfrac{1}{\ln a}\dfrac{1}{x}$

9. $(\sin x)' = \cos x$

10. $(\cos x)' = -\sin x$

11. $(\tan x)' = \sec^2 x$

12. $(\sec x)' = \sec x \tan x$

13. $(\csc x)' = -\csc x \cot x$

14. $(\cot x)' = -\csc^2 x$

15. $(\arcsin x)' = \dfrac{1}{\sqrt{1 - x^2}}$

16. $(\arccos x)' = -\dfrac{1}{\sqrt{1 - x^2}}$

17. $(\arctan x)' = \dfrac{1}{1 + x^2}$

18. $(\text{arcsec } x)' = \dfrac{1}{|x|\sqrt{x^2 - 1}}$

19. $(\text{arccsc } x)' = -\dfrac{1}{|x|\sqrt{x^2 - 1}}$

20. $(\text{arccot } x)' = -\dfrac{1}{1 + x^2}$

Basic Rules for Indefinite Integrals

1. $\int [f(x) + g(x)]\, dx = \int f(x)\, dx + \int g(x)\, dx$

2. $\int [f(x) - g(x)]\, dx = \int f(x)\, dx - \int g(x)\, dx$

3. $\int cf(x)\, dx = c \int f(x)\, dx$

Basic Indefinite Integrals

1. $\int 1\, dx = x + C$

2. $\int x^n\, dx = \dfrac{x^{n+1}}{n+1} + C \quad$ when $n \neq -1$

3. $\int \dfrac{1}{x}\, dx = \ln |x| + C$

4. $\int e^x\, dx = e^x + C$

5. $\int a^x\, dx = \dfrac{a^x}{\ln a} + C$

6. $\int \sin x\, dx = -\cos x + C$

7. $\int \cos x\, dx = \sin x + C$

8. $\int \sec^2 x\, dx = \tan x + C$

9. $\int \sec x \tan x\, dx = \sec x + C$

10. $\int \csc^2 x\, dx = -\cot x + C$

11. $\int \csc x \cot x\, dx = -\csc x + C$

12. $\int \dfrac{1}{\sqrt{1-x^2}}\, dx = \arcsin x + C$

13. $\int \dfrac{1}{1+x^2}\, dx = \arctan x + C$

14. $\int \dfrac{1}{|x|\sqrt{x^2-1}}\, dx = \text{arcsec}\, x + C$

Techniques of Integration

1. Substitution

2. Integration by Parts

3. Partial Fractions