Calculus Cheat Sheet :

Derivatives

1) $(c)' = 0$
2) $(x)' = 1$
3) $(kx)' = k$
4) $\left(e^x\right)' = e^x$
5) $\left(a^x\right)' = \ln(a) \cdot a^x$
6) $(\ln x)' = \dfrac{1}{x}$
7) $\left(\log_a x\right)' = \dfrac{1}{\ln(a) \cdot x}$
8) $(\sin x)' = \cos x$
9) $(\cos x)' = -\sin x$
10) $(\tan x)' = \sec^2 x$
11) $(\sec x)' = \sec x \cdot \tan x$
12) $(\csc x)' = -\csc x \cdot \cot x$
13) $(\cot x)' = -\csc^2 x$
14) $(\sinh x)' = \cosh x$
15) $(\cosh x)' = \sinh x$
16) $(\tanh x)' = \operatorname{sech}^2 x$
17) $(\operatorname{sech} x)' = -\operatorname{sech} x \cdot \tanh x$
18) $(\coth x)' = -\operatorname{csch}^2 x$
19) $\left(\sin^{-1} x\right)' = \dfrac{1}{\sqrt{1 - x^2}}$
20) $\left(\cos^{-1} x\right)' = \dfrac{-1}{\sqrt{1 - x^2}}$
21) $\left(\tan^{-1} x\right)' = \dfrac{1}{1 + x^2}$
22) $\left(\cot^{-1} x\right)' = \dfrac{-1}{1 + x^2}$

Operational Rules

Product Rule

$$(f \cdot g)' = f' \cdot g + f \cdot g'$$

Quotient Rule

$$\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

Chain Rules

$$(f(g))' = f'(g) \cdot g'$$

$$\left(e^f\right)' = e^f \cdot f'$$

$$(\ln(f))' = \frac{f'}{f}$$

$$\left(f^n\right)' = n \cdot f^{n-1} \cdot f'$$

Anti–Derivatives

1) $\displaystyle\int 0 \; dx = c$
2) $\displaystyle\int 1 \; dx = x + c$
3) $\displaystyle\int k \; dx = k \cdot x + c$
4) $\displaystyle\int x^n \; dx = \frac{1}{n+1} \cdot x^{n+1} + c$

   $(n \neq -1)$
5) $\displaystyle\int \frac{1}{x} \; dx = \ln|x| + c$
6) $\displaystyle\int e^x \; dx = e^x + c$
7) $\displaystyle\int a^x \; dx = \frac{1}{\ln(a)} \cdot a^x + c$
8) $\displaystyle\int \cos x \; dx = \sin x + c$
9) $\displaystyle\int \sin x \; dx = -\cos x + c$
10) $\displaystyle\int \sec^2 x \; dx = \tan x + c$
11) $\displaystyle\int \sec x \cdot \tan x \; dx = \sec x + c$
12) $\displaystyle\int \csc x \cdot \cot x \; dx = -\csc x + c$
13) $\displaystyle\int \frac{1}{\sqrt{1 - x^2}} \; dx = \sin^{-1} x + c$
14) $\displaystyle\int \frac{1}{a^2 + x^2} \; dx = \frac{1}{a} \cdot \tan^{-1}\left(\frac{x}{a}\right) + c$

Big Theorems

FTC #1: Given f(x) continuous on [a,b], then:

$$\int_a^b f(x) \; dx = F(b) - F(a), \text{ where } F'(x) = f(x)$$

FTC #2: Given f(t) continuous on [a,b], then for a function

$g(x) = \displaystyle\int_a^x f(t) \; dt$ we have $g'(x) = f(x)$.