

Spring 2019 Math 152
Formulas from Calculus I

courtesy: Amy Austin

Derivatives

1. $\frac{d}{dx}x^n = nx^{n-1}$
2. $\frac{d}{dx}\ln x = \frac{1}{x}$
3. $\frac{d}{dx}\ln(g(x)) = \frac{g'(x)}{g(x)}$
4. $\frac{d}{dx}e^x = e^x$
5. $\frac{d}{dx}a^x = a^x \ln a$
6. $\frac{d}{dx}e^{g(x)} = g'(x)e^{g(x)}$
7. $\frac{d}{dx}a^{g(x)} = g'(x)a^{g(x)} \ln a$
8. $\frac{d}{dx}\cos^{-1}x = \frac{-1}{\sqrt{1-x^2}}$
9. $\frac{d}{dx}\sin^{-1}x = \frac{1}{\sqrt{1-x^2}}$
10. $\frac{d}{dx}\tan^{-1}x = \frac{1}{1+x^2}$
11. $\frac{d}{dx}\sin x = \cos x$
12. $\frac{d}{dx}\cos x = -\sin x$
13. $\frac{d}{dx}\tan x = \sec^2 x$
14. $\frac{d}{dx}\sec x = \sec x \tan x$
15. $\frac{d}{dx}\csc x = -\csc x \cot x$
16. $\frac{d}{dx}\cot x = -\csc^2 x$
17. Product Rule: $\frac{d}{dx}gh = g'h + gh'$
18. Quotient Rule: $\frac{d}{dx}\frac{g}{h} = \frac{g'h - gh'}{h^2}$
19. Chain Rule: $\frac{d}{dx}f(g(x)) = f'(g(x))g'(x)$

Integrals

20. $\int x^n dx = \frac{x^{n+1}}{n+1} + C$, if $n \neq -1$
21. $\int e^x dx = e^x + C$
22. $\int a^x dx = \frac{a^x}{\ln a} + C$
23. $\int \frac{1}{x} dx = \ln|x| + C$
24. $\int \frac{1}{1+x^2} dx = \arctan x + C$
25. $\int \frac{1}{a^2+x^2} dx = \frac{1}{a} \arctan\left(\frac{x}{a}\right) + C$
26. $\int \frac{1}{\sqrt{1-x^2}} dx = \arcsin x + C$
27. $\int \cos x dx = \sin x + C$
28. $\int \sin x dx = -\cos x + C$
29. $\int \sec x \tan x dx = \sec x + C$
30. $\int \sec^2 x dx = \tan x + C$
31. $\int \csc x \cot x dx = -\csc x + C$
32. $\int \csc^2 x dx = -\cot x + C$

Logarithm Rules

33. $\ln PQ = \ln P + \ln Q$
34. $\ln \frac{P}{Q} = \ln P - \ln Q$
35. $\ln P^r = r \ln P$

Useful Trig Identities

36. $\cos^2 x + \sin^2 x = 1$
37. $\tan^2 x + 1 = \sec^2 x$
38. $\cos^2 x = \frac{1}{2}[1 + \cos 2x]$
39. $\sin^2 x = \frac{1}{2}[1 - \cos 2x]$
40. $\sin 2x = 2 \sin x \cos x$
41. $\cos 2x = 1 - 2 \sin^2 x = 2 \cos^2 x - 1$