Fall 2005 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. $\frac{d}{dx}e^{g(x)} = g'(x)e^{g(x)}$
6. $\frac{d}{dx}\cos^{-1} x = \frac{-1}{\sqrt{1-x^2}}$
7. $\frac{d}{dx}\sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$
8. $\frac{d}{dx}\tan^{-1} x = \frac{1}{1+x^2}$
9. $\frac{d}{dx}\sin x = \cos x$
10. $\frac{d}{dx}\cos x = -\sin x$
11. $\frac{d}{dx}\tan x = \sec^2 x$
12. $\frac{d}{dx}\sec x = \sec x \tan x$
13. $\frac{d}{dx}\csc x = -\csc x \cot x$
14. $\frac{d}{dx}\cot x = -\csc^2 x$
15. Product Rule: $\frac{d}{dx}gh = g'h + gh'$
16. Quotient Rule: $\frac{d}{dx}\frac{g}{h} = \frac{g'h - gh'}{h^2}$
17. Chain Rule:
    a.) Form 1: $\frac{d}{dx}[g(x)]^n = n[g(x)]^{n-1}g'(x)$
    b.) Form 2: $\frac{d}{dx}f(g(x)) = f'(g(x))g'(x)$

Integrals

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

Logarithm Rules

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

Useful Identities

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