Derivative Notes

1. $\frac{d}{dx} c = 0$, where c is a constant

2. $\frac{d}{dx} x^n = n x^{n-1}$

3. $\frac{d}{dx} b^x = \ln(b) \cdot b^x$, where $b \in R$

4. $\frac{d}{dx} e^x = e^x$ Note: This is a special case of 3.

5. $\frac{d}{dx} \ln(x) = \frac{1}{x}$

6. $\frac{d}{dx} \sin(x) = \cos(x)$

7. $\frac{d}{dx} \cos(x) = -\sin(x)$

8. $\frac{d}{dx} \tan(x) = \sec^2(x)$

9. $\frac{d}{dx} \csc(x) = (-\csc(x))(\cot(x))$

10. $\frac{d}{dx} \sec(x) = (\sec(x))(\tan(x))$

11. $\frac{d}{dx}\cot(x) = -\csc^2(x)$

12. Sum and Difference Rule: Let $h(x) = f(x) \pm g(x)$.
Then, $h'(x) = f'(x) \pm g'(x)$

13. Product Rule: Let $h(x) = f(x) \cdot g(x)$.
Then, $h'(x) = f'(x)g(x) + f(x)g'(x)$

14. Quotient Rule: Let $h(x) = \frac{f(x)}{g(x)}$.

Then, $h'(x) = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$

15. Chain Rule: Let $h(x) = f(g(x))$.
Then, $h'(x) = f'(g(x))(g'(x))$

16. $\frac{d}{dx} - f(x) = -\frac{d}{dx} f(x)$