Derivative Rules:

1. $\frac{d}{dx}(k) = 0$, k = const.

2. $\frac{d}{dx} k\, f(x) = k \frac{d}{dx} f(x)$

3. $\frac{d}{dx}[f(x) + g(x)] = \frac{d}{dx} f(x) + \frac{d}{dx} g(x)$
   $\frac{d}{dx}[f(x) - g(x)] = \frac{d}{dx} f(x) - \frac{d}{dx} g(x)$

4. $\frac{d}{dx}(u.v) = u\frac{dv}{dx} + v\frac{du}{dx}$ … Product Rule.

5. $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$ … Quotient Rule.

6. $\frac{d}{dx}(f \circ g) = \frac{d}{dx} f[g(x)] = f'[g(x)] \cdot g'(x)$ … Chain Rule.

Derivative Formulae:

1. $\frac{d}{dx}(x^n) = nx^{n-1}$

2. $\frac{d}{dx}(a^x) = a^x \ln(a)$ and so $\frac{d}{dx}(e^x) = e^x$

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

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

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

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

7. $\frac{d}{dx}(\cot x) = -\text{cosec}^2 x$

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

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

10. $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$

11. $\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$

12. $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$

13. $\frac{d}{dx}(\cot^{-1} x) = -\frac{1}{1+x^2}$

14. $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{\left|x\sqrt{x^2-1}\right|}$

15. $\frac{d}{dx}(\text{cosec}^{-1} x) = -\frac{1}{\left|x\sqrt{x^2-1}\right|}$

Note: If the argument begins with the letter ‘c’, then the answer begins with a negative sign.

Note: log x is the same as ln x (log to the base e of x), unless the base is specifically mentioned.