Differentiation Rules

Consider differentiable functions f and g

1. Constant Rule: $\frac{d}{dx} constant = 0$

2. Sum Rule: $\frac{d}{dx}\left(f(x) + g(x)\right) = f'(x) + g'(x)$

3. Difference Rule: $\frac{d}{dx}\left(f(x) - g(x)\right) = f'(x) - g'(x)$

4. Constant Multiple Rule: $\frac{d}{dx}\left(c \cdot f(x)\right) = c \cdot f'(x)$

5. Power Rule: $\frac{d}{dx}\left(x^n\right) = nx^{n-1}$

6. Product Rule: $\frac{d}{dx}\left(f(x) \cdot g(x)\right) = f(x) \cdot g'(x) + g(x) \cdot f'(x)$

7. Quotient Rule: $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x) \cdot f'(x) - f(x) \cdot g'(x)}{(g(x))^2}$

8. Chain Rule: $\frac{d}{dx}\left(f(g(x))\right) = f'(g(x)) \cdot g'(x)$