Derivative Rules

This handout contains the derivative rule patterns.

1. $\dfrac{d}{d(\ )}\text{constant} = 0$

2. $\dfrac{d}{d(\ )}\text{variable} = 1$

3. $\dfrac{d}{d(\ )}\text{something}^{\text{number}} = \text{number} \cdot \text{something}^{\text{number}-1} \cdot \dfrac{d}{d(\ )}\text{something}$

4. $\dfrac{d}{d(\ )}\left(\text{constant} \cdot \text{something}\right) = \text{constant} \cdot \dfrac{d}{d(\ )}(\text{something})$

5. $\dfrac{d}{d(\ )}\left(\text{first} \pm \text{second}\right) = \dfrac{d}{d(\ )}\text{first} \pm \dfrac{d}{d(\ )}\text{second}$

6. $\dfrac{d}{d(\ )}\left(\text{first} \cdot \text{second}\right) = \dfrac{d}{d(\ )}\text{first} \cdot \text{second} + \text{first} \cdot \dfrac{d}{d(\ )}\text{second}$

7. $\dfrac{d}{d(\ )}\left(\dfrac{\text{top}}{\text{bottom}}\right) = \dfrac{\frac{d}{d(\ )}\text{top} \cdot \text{bottom} - \text{top} \cdot \frac{d}{d(\ )}\text{bottom}}{\text{bottom}^2}$

8. $\dfrac{d}{d(\ )}e^{\text{something}} = e^{\text{something}} \cdot \dfrac{d}{d(\ )}\text{something}$

9. $\dfrac{d}{d(\ )}\ln(\text{something}) = \dfrac{1}{\text{something}} \cdot \dfrac{d}{d(\ )}\text{something}$

10. $\dfrac{d}{d(\ )}\sin(\text{something}) = \cos(\text{something}) \cdot \dfrac{d}{d(\ )}\text{something}$

11. $\dfrac{d}{d(\ )}\cos(\text{something}) = -\sin(\text{something}) \cdot \dfrac{d}{d(\ )}\text{something}$

12. $\dfrac{d}{d(\ )}\tan(\text{something}) = \sec^2(\text{something}) \cdot \dfrac{d}{d(\ )}\text{something}$

13. $\dfrac{d}{d(\ )}\csc(\text{something}) = -\csc(\text{something})\cot(\text{something}) \cdot \dfrac{d}{d(\ )}\text{something}$

14. $\dfrac{d}{d(\ )}\sec(\text{something}) = \sec(\text{something})\tan(\text{something}) \cdot \dfrac{d}{d(\ )}\text{something}$

15. $\dfrac{d}{d(\ )}\cot(\text{something}) = -\csc^2(\text{something}) \cdot \dfrac{d}{d(\ )}\text{something}$

16. $\dfrac{d}{d(\ )}\arcsin(\text{something}) = \dfrac{1}{\sqrt{1-\text{something}^2}} \cdot \dfrac{d}{d(\ )}\text{something}$

17. $\dfrac{d}{d(\ )}\arctan(\text{something}) = \dfrac{1}{1+\text{something}^2} \cdot \dfrac{d}{d(\ )}\text{something}$

18. $\dfrac{d}{d(\ )}\operatorname{arcsec}(\text{something}) = \dfrac{1}{\text{something} \cdot \sqrt{\text{something}^2-1}} \cdot \dfrac{d}{d(\ )}\text{something}$

19. $\dfrac{d}{d(\ )}\arccos(\text{something}) = -\dfrac{d}{d(\ )}\arcsin(\text{something})$

20. $\dfrac{d}{d(\ )}\operatorname{arccot}(\text{something}) = -\dfrac{d}{d(\ )}\arctan(\text{something})$

21. $\dfrac{d}{d(\ )}\operatorname{arccsc}(\text{something}) = -\dfrac{d}{d(\ )}\operatorname{arcsec}(\text{something})$