Basic Differentiation Rules for Elementary Functions

1. $\dfrac{d}{dx}[cu] = cu'$

2. $\dfrac{d}{dx}[u \pm v] = u' \pm v'$

3. $\dfrac{d}{dx}[uv] = uv' + vu'$

4. $\dfrac{d}{dx}\left[\dfrac{u}{v}\right] = \dfrac{vu' - uv'}{v^2}$

5. $\dfrac{d}{dx}[c] = 0$

6. $\dfrac{d}{dx}[u^n] = nu^{n-1}u'$

7. $\dfrac{d}{dx}[x] = 1$

8. $\dfrac{d}{dx}[|u|] = \dfrac{u}{|u|}(u')$

9. $\dfrac{d}{dx}[\ln u] = \dfrac{u'}{u}$

10. $\dfrac{d}{dx}[e^u] = e^u u'$

11. $\dfrac{d}{dx}[\log_a u] = \dfrac{u'}{(\ln a)u}$

12. $\dfrac{d}{dx}[a^u] = (\ln a)a^u u'$

13. $\dfrac{d}{dx}[\sin(u)] = (\cos(u))u'$

14. $\dfrac{d}{dx}[\cos(u)] = (-\sin(u))u'$

15. $\dfrac{d}{dx}[\tan(u)] = (\sec^2(u))u'$

16. $\dfrac{d}{dx}[\cot(u)] = -(\csc^2(u))u'$

17. $\dfrac{d}{dx}[\sec(u)] = (\sec(u)\tan(u))u'$

18. $\dfrac{d}{dx}[\csc(u)] = -(\csc(u)\cot(u))u'$

19. $\dfrac{d}{dx}[\arcsin(u)] = \dfrac{u'}{\sqrt{1-u^2}}$

20. $\dfrac{d}{dx}[\arccos(u)] = \dfrac{-u'}{\sqrt{1-u^2}}$

21. $\dfrac{d}{dx}[\arctan(u)] = \dfrac{u'}{1+u^2}$

22. $\dfrac{d}{dx}[\operatorname{arccot}(u)] = \dfrac{-u'}{1+u^2}$

23. $\dfrac{d}{dx}[\operatorname{arcsec}(u)] = \dfrac{u'}{|u|\sqrt{u^2-1}}$

24. $\dfrac{d}{dx}[\operatorname{arccsc}(u)] = \dfrac{-u'}{|u|\sqrt{u^2-1}}$

"It's not the work that's hard, it's the discipline." **Anonymous**

"Always give without remembering and always receive without forgetting." **Brian Tracy**