

Basic Differentiation Rules

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

$$3. \frac{d}{dx}[uv] = u'v + uv'$$

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

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

$$9. \frac{d}{dx}[|u|] = \frac{u}{|u|}(u'), \quad u \neq 0$$

$$11. \frac{d}{dx}[e^u] = e^u \cdot u'$$

$$13. \frac{d}{dx}[a^u] = (\ln a)a^u \cdot u'$$

$$15. \frac{d}{dx}[\cos u] = -(\sin u)u'$$

$$17. \frac{d}{dx}[\cot u] = -(\csc^2 u)u'$$

$$19. \frac{d}{dx}[\csc u] = -(\csc u \cdot \cot u)u'$$

$$21. \frac{d}{dx}[\arccos u] = \frac{-u'}{\sqrt{1-u^2}}$$

$$23. \frac{d}{dx}[\operatorname{arccot} u] = \frac{-u'}{1+u^2}$$

$$25. \frac{d}{dx}[\operatorname{arccsc} u] = \frac{-u'}{|u|\sqrt{u^2-1}}$$

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

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

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

$$8. \frac{d}{dx}[\sqrt{u}] = \frac{u'}{2\sqrt{u}}$$

$$10. \frac{d}{dx}[\ln u] = \frac{u'}{u}$$

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

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

$$16. \frac{d}{dx}[\tan u] = (\sec^2 u)u'$$

$$18. \frac{d}{dx}[\sec u] = (\sec u \cdot \tan u)u'$$

$$20. \frac{d}{dx}[\arcsin u] = \frac{u'}{\sqrt{1-u^2}}$$

$$22. \frac{d}{dx}[\arctan u] = \frac{u'}{1+u^2}$$

$$24. \frac{d}{dx}[\operatorname{arcsec} u] = \frac{u'}{|u|\sqrt{u^2-1}}$$