

Basic Differentiation Rules

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$23. \frac{d}{dx} [\text{arcsec } u] = \frac{u'}{|u|\sqrt{u^2-1}}$$

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