

Basic Differentiation Rules

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

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

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

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

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

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

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

$$8. \frac{d}{dx}[|u|] = \frac{u}{|u|}(u'), \quad u \neq 0$$

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

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

$$11. \frac{d}{dx}[\sin u] = (\cos u)u'$$

$$12. \frac{d}{dx}[\cos u] = -(\sin u)u'$$

$$13. \frac{d}{dx}[\tan u] = (\sec^2 u)u'$$

$$14. \frac{d}{dx}[\cot u] = -(\csc^2 u)u'$$

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

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

$$17. \frac{d}{dx}[\arcsin u] = \frac{u'}{\sqrt{1-u^2}}$$

$$18. \frac{d}{dx}[\arccos u] = \frac{-u'}{\sqrt{1-u^2}}$$

$$19. \frac{d}{dx}[\arctan u] = \frac{u'}{1+u^2}$$

$$20. \frac{d}{dx}[\operatorname{arc cot} u] = \frac{-u'}{1+u^2}$$

$$21. \frac{d}{dx}[\operatorname{arc sec} u] = \frac{u'}{|u|\sqrt{u^2-1}}$$

$$22. \frac{d}{dx}[\operatorname{arc csc} u] = \frac{-u'}{|u|\sqrt{u^2-1}}$$