Self-Assessment Quiz: Implicit Differentiation and Chain Rule

Ungraded Quiz – For Practice and Understanding

Q1. Find $\dfrac{dy}{dx}$ if $y^2 + x^2 = 25$.

(a) $\dfrac{x}{y}$

(b) $-\dfrac{x}{y}$

(c) $\dfrac{y}{x}$

(d) $-\dfrac{y}{x}$

Q2. For the function $x^2 + xy + y^2 = 7$, find $\dfrac{dy}{dx}$.

(a) $\dfrac{-2x - y}{x + 2y}$

(b) $\dfrac{-2y - x}{x + 2y}$

(c) $\dfrac{2x + y}{x - 2y}$

(d) $\dfrac{2y + x}{2x + y}$

Q3. If $\sin(xy) = x$, find $\dfrac{dy}{dx}$.

(a) $\dfrac{1 - y\cos(xy)}{x\cos(xy)}$

(b) $\dfrac{\cos(xy)}{y - x}$

(c) $\dfrac{1 - y\cos(xy)}{x\cos(xy)}$

(d) $\dfrac{\cos(xy)}{y}$

Q4. Differentiate $y = \sin(3x^2)$ using the chain rule.

(a) $6x\cos(3x^2)$

(b) $3x^2\cos(3x^2)$

(c) $6x\sin(3x^2)$

(d) $\cos(3x^2)$

Q5. If $y = e^{x^3+2x}$, find $\dfrac{dy}{dx}$.

(a) $(3x^2 + 2)e^{x^3+2x}$

(b) $e^{x^3+2x}(x^3 + 2x)$

(c) $3x^2e^x$

(d) e^{x^3+2x}

Q6. Differentiate $y = \ln(\sin x)$ with respect to x.

(a) $\cot x$

(b) $\csc x$

(c) $\tan x$

(d) $\cot x \csc x$

Q7. If $y = (x^2 + 1)^5$, find $\dfrac{dy}{dx}$.

(a) $5(x^2 + 1)^4$

(b) $10x(x^2 + 1)^4$

(c) $2x(x^2 + 1)^5$

(d) $x(x^2 + 1)^4$

Q8. For $x^3 + y^3 = 6xy$, find $\dfrac{dy}{dx}$.

(a) $\dfrac{2y - x^2}{y^2 - 2x}$

(b) $\dfrac{2y - x}{y - 2x}$

(c) $\dfrac{2y - x^2}{2x - y^2}$

(d) $\dfrac{2x - y}{2y - x}$

Q9. If $y = \tan^{-1}(x^2)$, find $\dfrac{dy}{dx}$.

(a) $\dfrac{1}{1 + x^4}$

(b) $\dfrac{2x}{1 + x^4}$

(c) $\dfrac{2x}{1 - x^4}$

(d) $\dfrac{x^2}{1 + x^4}$

Q10. Find $\dfrac{dy}{dx}$ if $e^y + y = x$.

(a) $\dfrac{1}{1 + e^y}$

(b) $\dfrac{e^y}{1+e^y}$

(c) $e^y(1+y)$

(d) $\dfrac{1}{1-e^y}$

Q11. The chain rule is used when:

(a) A function is a product of two variables

(b) A function is a composition of two or more functions

(c) Both functions are independent

(d) Functions are constant

Q12. For $y = \sin^{-1}(3x^2)$, find $\dfrac{dy}{dx}$.

(a) $\dfrac{6x}{\sqrt{1-9x^4}}$

(b) $\dfrac{3x}{\sqrt{1-9x^4}}$

(c) $\dfrac{6x}{\sqrt{1+9x^4}}$

(d) $\dfrac{6x^2}{\sqrt{1-9x^4}}$

Answers (for self-check):
1(b), 2(a), 3(a), 4(a), 5(a), 6(a), 7(b), 8(c), 9(b), 10(a), 11(b), 12(a)