Self-Assessment Quiz: Derivatives, Rates of Change, Tangent Line & Rules

Ungraded Quiz – For Practice and Understanding

Q1. The derivative of a function $f(x)$ represents:

(a) The area under the curve

(b) The instantaneous rate of change of $f(x)$

(c) The total change in $f(x)$ over an interval

(d) The slope of the secant line

Q2. The slope of the tangent line to $f(x)$ at $x = a$ is:

(a) $f(a)$

(b) $f'(a)$

(c) $\frac{f(a)}{a}$

(d) $\frac{f(a+h)-f(a)}{h}$

Q3. The derivative of $f(x) = 3x^2 + 2x - 5$ is:

(a) $3x + 2$

(b) $6x + 2$

(c) $x^2 + 2$

(d) $6x$

Q4. The expression $\lim_{h\to 0} \dfrac{f(a+h) - f(a)}{h}$ defines:

(a) The derivative of f at a

(b) The integral of f

(c) The tangent line to f

(d) The average rate of change

Q5. The instantaneous rate of change of $y = f(x)$ at $x = a$ equals:

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

(b) $\dfrac{dy}{dx}$

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

(d) $\dfrac{f(a+h)}{a}$

Q6. The derivative of a constant function $f(x) = c$ is:

(a) c

(b) 0

(c) x

(d) Undefined

Q7. If $f(x) = x^3$, then $f'(x) =$:

(a) $3x^2$

(b) $2x$

(c) $x^2 + 3$

(d) $x^3 + 1$

Q8. The tangent line to $f(x)$ at $x = a$ can be written as:

(a) $y = f(a)x + f'(a)$

(b) $y = f'(a)x + a$

(c) $y - f(a) = f'(a)(x - a)$

(d) $y = f(x) + f'(x)$

Q9. If $y = 5x^4 - 2x^3 + 7$, then $\dfrac{dy}{dx}$ is:

(a) $20x^3 - 6x^2$

(b) $4x^3 - 3x^2$

(c) $5x^3 - 2x^2$

(d) $20x^2 - 6x$

Q10. The derivative of $\sin x$ is:

(a) $\cos x$

(b) $-\sin x$

(c) $-\cos x$

(d) $\tan x$

Q11. The derivative of $\cos x$ is:

(a) $\sin x$

(b) $-\sin x$

(c) $\tan x$

(d) $\sec^2 x$

Q12. If $f(x) = e^x$, then $f'(x) =$:

(a) e^x

(b) xe^{x-1}

(c) $\ln(e)x$

(d) 1

Q13. The derivative of $\ln x$ is:

(a) x

(b) $\frac{1}{x}$

(c) $\ln(x-1)$

(d) $\frac{1}{x^2}$

Q14. If $f(x) = 3x^2 - 4x + 1$, find $f'(2)$.

(a) 8

(b) $12 - 4 = 8$

(c) 2

(d) 4

Q15. The derivative of $f(x) = \frac{1}{x}$ is:

(a) 1

(b) $\frac{1}{x^2}$

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

(d) x^{-1}

Answers (for self-check):
1(b), 2(b), 3(b), 4(a), 5(b), 6(b), 7(a), 8(c), 9(a), 10(a), 11(b), 12(a), 13(b), 14(b), 15(c)