AP Calculus AB Unit 2 derivative rules sheet

The definition

f(x) = lim (h 0) [f(x + h) - f(x)] ÷ h, provided the limit exists.

At a point: f(a) = lim (x a) [f(x) - f(a)] ÷ (x - a).

f(x) is the slope of f at x. It is not the height of f.

Derivatives to know

Function	Derivative
c (a constant)	0
x	$n \cdot x^1$
sin x	cos x
cos x	-sin x
tan x	$\sec^2$ x
cot x	$-\csc^2$ x
sec x	sec x tan x
csc x	-csc x cot x
e	e
ln x	1 ÷ x
u · v	uv + uv
u ÷ v	$(v \cdot u - u \cdot v) \div v^2$

Where a derivative does not exist

- A corner, where the slopes from the left and right differ (|x| at x = 0)
- A vertical tangent (x at x = 0)
- Any point where f is not continuous: a jump, a hole or an asymptote
- Any point outside the domain of f

Differentiable at a point means continuous there. Continuous does not mean differentiable.

Part A checklist

1. Does the limit look like a difference quotient? Name f and a, then use a rule.
2. Can you rewrite first? Turn roots and fractions into powers, or split the fraction.
3. What is the outermost operation? Choose the product or quotient rule from that.
4. In the quotient rule, is the second product in brackets?

5. Is the original denominator nonzero at the input?
6. Are you reading f or f from the table or graph?
7. Have you used exact values: cos = -1, sin = 0, ln 1 = 0, e = 1?