AP Calculus
A Notebook

Peter Bossev

Contents

1 Unit 2: Differentiation: Definition and Basic Derivative Rules

This unit will make up 10-12% (AB) or 4-7% (BC) of the AP exam score, and is usually covered in ∼13-14 (AB) or ∼9-10 (BC) class periods

1.1 Defining Average and Instantaneous Rates of Change at a Point

1.2 Defining the Derivative of a Function and Using Derivative Notation

1.3 Estimating Derivatives of a Function at a Point

1.4 Connecting Differentiability and Continuity: Determining When Derivatives Do and Do Not Exist

1.5 Applying the Power Rule

The Power Rule

$$\frac{d}{dx}[x^n] = nx^{n-1}$$

1.6 Derivative Rules: Constant, Sum, Difference, and Constant Multiple

Constant Rule

$$\frac{d}{dx}[kx] = k\frac{d}{dx}[x]$$

Coefficient Rule

$$\frac{d}{dx}[kf(x)] = k\frac{d}{dx}[f(x)]$$

Sum/Difference Rule

$$\frac{d}{dx}[f(x) \pm g(x)] = \frac{df}{dx} \pm \frac{dg}{dx}$$

Chain Rule

$$\frac{df}{dx} = \frac{df}{du}\frac{du}{dx}$$

or

$$\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$$

Product Rule

$$\frac{d}{dx}[f(x)g(x)] = \frac{df}{dx}g(x) + \frac{dg}{dx}f(x)$$

Quotient Rule

$$\frac{d}{dx}[\frac{f(x)}{g(x)}] = \frac{g(x)\frac{df}{dx} - f(x)\frac{dg}{dx}}{g(x)^2}$$

Derivative of transcendental functions

$$\frac{d}{dx}[ln(x)] = \frac{1}{x}$$

$$\frac{d}{dx}[a^x] = a^x ln(x)$$

$$\frac{d}{dx}[e^x] = e^x$$

$$\frac{d}{dx}[sin(x)] = cos(x)$$

$$\frac{d}{dx}[cos(x)] = -sin(x)$$

$$\frac{d}{dx}[log_a(x)] = \frac{1}{ln(x)a}$$

REMEMBER CHAIN RULE

1.11   Overview

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