

AP CALC BC FORMULA STUDY GUIDE

Absolute Value

$$|x| = \begin{cases} -x, & \text{if } x < 0 \\ x, & \text{if } x \geq 0 \end{cases}$$

Even / Odd Function

evaluate $f(x)$ $f(-x) = f(x)$	f' is even	symmetric to $y = x$
$f(-x) = -f(x)$	odd	origin

Theorems

$$\lim_{x \rightarrow a} f(g(x)) = f(\lim_{x \rightarrow a} g(x))$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1 \quad \lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$$

Horizontal Asymptote(s) of f

$$y = \lim_{x \rightarrow \infty} f(x) \text{ or } y = \lim_{x \rightarrow -\infty} f(x)$$

Infinite Limits

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$$

- if $f(x)$ grows faster, the limit = ∞
- if $g(x)$ grows faster, the limit = 0
- if $f(x)$ & $g(x)$ are polynomials with the same degree, the limit = the ratio of their leading coefficients

Continuity

f is continuous at a number a , if

(1) $f(a)$ is defined

(2) $\lim_{x \rightarrow a} f(x)$ exists

(3) $\lim_{x \rightarrow a} f(x) = f(a)$

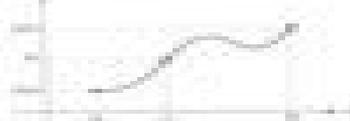
Intermediate Value Theorem

If f is continuous on $[a, b]$ and f is arbitrary between

$f(a)$ and $f(b)$, then there is at least

one number c in $[a, b]$ such that

$$f(c) = M.$$



Average Rate of Change of a function $f(x)$ over closed

$$\text{interval } [a, b] \text{ is } \frac{f(b) - f(a)}{b - a}$$

Chain Rule

Definition of a Derivative

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

Derivatives

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

$$\frac{d}{dx} (e^x) = e^x$$

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

$$\frac{d}{dx} (e^{-x}) = -e^{-x}$$

$$\frac{d}{dx} \tan(x) = \sec^2(x)$$

$$\frac{d}{dx} (e^{ax}) = ae^{ax}$$

$$\frac{d}{dx} \sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$$

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

$$\frac{d}{dx} \cos^{-1}(x) = -\frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \tan^{-1}(x) = \frac{1}{1+x^2}$$

$$\frac{d}{dx} [f^{-1}(x)] = \frac{1}{f'(f^{-1}(x))}$$

Product Rule

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

Quotient Rule

$$\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$$

Chain Rule

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

Linear Approximation / Tangent

$$\text{Line approximation of } f \text{ at } a \text{ is } L(x) = f'(a)(x-a) + f(a)$$

L'Hopital's Rule

$$\text{if } \lim_{x \rightarrow a} \frac{f(x)}{g(x)} = 0/0 \text{ or } \infty/\infty,$$

$$\text{then } \lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$$

Mean Value Theorem

If f is continuous on $[a, b]$ and differentiable on (a, b) , then there is a number c in (a, b) such that

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$



Extreme Value Theorem

If f is continuous on $[a, b]$, then f has both a minimum and a maximum on the interval.

Critical Number

c is a critical number of f if either $f'(c)$ does not exist or $f'(c) = 0$.

Absolute Minimum/Maximum of f over a Closed Interval $[a, b]$

- Find the critical values of f .
- Plug critical values and endpoints into f to find the absolute min/max.

Increasing / Decreasing

Let f be continuous on $[a, b]$ and differentiable on (a, b) .

- if $f'(x) > 0$, f is increasing
- if $f'(x) < 0$, f is decreasing

First Derivative Test

Let c be a critical number of a continuous function f .

- if $f'(x)$ changes from positive to negative at c , then f has a local maximum at c .
- if $f'(x)$ changes from negative to positive at c , then f has a local minimum at c .

Concavity

- if $f''(x) > 0$, f is concave up
- if $f''(x) < 0$, f is concave down

Point of Inflection

is where f is continuous and changes from concave up to concave down, or vice versa.

Second Derivative Test

If f has a critical value at c , $f'(c) = 0$, and

- if $f''(c) > 0$, then f has a local minimum at c .
- if $f''(c) < 0$, then f has a local maximum at c .

Particle motion at rest: $v(t) = 0$

Moving in positive direction: $a(t) > 0$

Moving in negative direction: $a(t) < 0$

Calculus Bc Ap Study Guide

G Psacharopoulos



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Vermont Ms Rosebush earned her Bachelor of Arts degree in elementary education with a concentration in mathematics at the University of New York in Cortland N Y She received her Master s Degree in education from Saint Michael s College Colchester Vermont Flavia Banu graduated from Queens College of the City University of New York with a B A in Pure Mathematics and an M A in Pure Mathematics in 1997 Ms Banu was an adjunct professor at Queens College where she taught Algebra and Calculus II Currently she teaches mathematics at Bayside High School in Bayside New York and coaches the math team for the school Her favorite course to teach is AP Calculus because it requires the most discipline rigor and creativity About Our Editor and Technical Accuracy Checker Stu Schwartz has been teaching mathematics since 1973 For 35 years he taught in the Wissahickon School District in Ambler Pennsylvania specializing in AP Calculus AB and BC and AP Statistics Mr Schwartz received his B S degree in Mathematics from Temple University Philadelphia Mr Schwartz was a 2002 recipient of the Presidential Award for Excellence in Mathematics Teaching and also won the 2007 Outstanding Educator of the Year Award for the Wissahickon School District Mr Schwartz s website www.mastermathmentor.com is geared toward helping educators teach AP Calculus AP Statistics and other math courses Mr Schwartz is always looking for ways to provide teachers with new and innovative teaching materials believing that it should be the goal of every math teacher not only to teach students mathematics but also to find joy and beauty in math as well [AP Calculus BC Prep Plus 2020 & 2021](#) Kaplan Test Prep,2020-02-04 Kaplan s AP Calculus BC Prep Plus 2020 2021 is revised to align with the latest exam This edition features more than 1 000 practice questions in the book and online complete explanations for every question and a concise review of high yield content to quickly build your skills and confidence Test like practice comes in 6 full length exams 15 pre chapter quizzes 15 post chapter quizzes and 22 online quizzes Customizable study plans ensure that you make the most of the study time you have We re so confident that AP Calculus AB Prep Plus offers the guidance you need that we guarantee it after studying with our online resources and book you ll score higher on the exam or you ll get your money back To access your online resources go to kaptest.com moreonline and follow the directions You ll need your book handy to complete the process The College Board has announced that the 2021 exam dates for AP Calculus AB will be May 4 May 24 or June 9 depending on the testing format Each school will determine the testing format for their students Expert Guidance We know the test our AP experts make sure our practice questions and study materials are true to the exam We know students every explanation is written to help you learn and our tips on the exam structure and question formats will help you avoid surprises on Test Day We invented test prep Kaplan kaptest.com has been helping students for 80 years and 9 out of 10 Kaplan students get into one or more of their top choice colleges **AP Calculus BC Prep** David S. Kahn,2020 Ace the AP Calculus AB Exam with this comprehensive study guide which includes 5 full length practice tests content reviews targeted strategies and access to online extras Techniques That Actually Work Tried and true strategies to help you avoid traps and beat the test Tips for pacing yourself and guessing logically Essential tactics to help you work smarter not harder Everything

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