2024 – 2025

AP Calculus BC Summer Assignment (students moving from Pre-Calc to Calc BC)

Resources Needed: Calculus Textbook, Graphing Calculator, internet access

Calculus is the mathematical study of continuous change. It is traditionally broken into two sections – differential calculus and integral calculus. This course will first explore differential calculus, or the rates at which quantities change, and then integral calculus, or accumulation of change. Later in the year, these concepts will be applied to less familiar types of functions including parametric and polar, as well as to infinite series.

Moving from Pre-Calculus to Calculus BC, it will be necessary for you to come into this course with some familiarity with limits and general derivative and integral concepts and rules. Included in this packet are suggested resources from the course textbook and FlippedMath.com. Flipped Math lessons include notes sheets that can be printed and completed during the videos as well as practice problems. I am not assigning specific problems – use as you feel necessary. Please do not attempt to cover a full year of Calculus AB concepts on your own; all BC courses including this one cover AB concepts, delving deeper and/or moving more quickly than during a typical AB course.

The AP Calculus Course and Exam Description, or CED, Units 1 and 2 will be covered quickly in September. Unit 1 focuses on Limits and Continuity which you have had some exposure to in Pre-Calculus; Unit 2 introduces differentiation and basic derivative rules. Starting this course, you will need to have some knowledge of Limits and Differentiation.

In mid-November the course will transition from differential calculus to integral calculus. Unit 6 of the AP Calculus CED begins with exploring accumulation of change and using integrals to approximate area under a curve. At this point, you will need to be familiar with the basic concepts and integral rules in the first part of the unit. We will build on these integration basics exploring more advanced integration techniques throughout the unit and later in the course.

Lastly, and equally important, take a break this summer. Everyone needs one! Relax, enjoy, and recharge. Do not spend all summer doing Calculus. If you are stuck or have questions, reach out. I look forward to working with you next school year!

Mrs. Meyers

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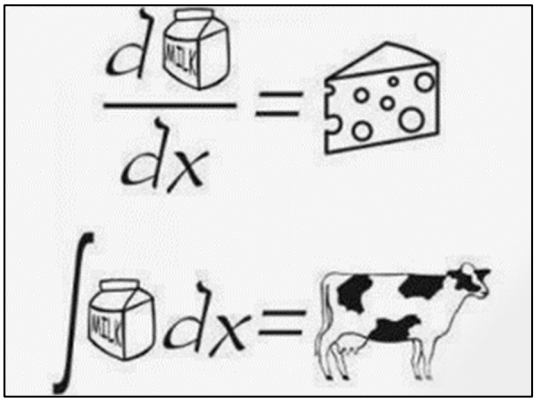
Summary of Calculus



Limits and Continuity

Definition of a Limit and Limit Notation (p. 60)
Properties of Limits (p. 61)
In order for a limit to exist… (p. 64)
Continuity Test (p. 79): A function is continuous at $x = a$ if and only if: 1. $f(a)$ is defined 2. $\lim_{x \to a-} f(x) = \lim_{x \to a+} f(x)$: limit exists at a 3. $f(a) = \lim_{x \to a} f(x)$: value of the function at a is equal to the limit at a

Flipped Math Calculus Version 1 https://calculus.flippedmath.com/version-1.html

Lesson 1.2 Defining Limits and Using Limit Notation
Lesson 1.3 Estimating Limit Values from Graphs
Lesson 1.4 Estimating Limit Values from Tables

Differentiation and Derivative Rules

Average Rate of Change (p. 87)
Instantaneous Rate of Change (p. 59, 91)
Definition of a Derivative and Notation (p. 101)

The Power Rule (p. 118)
The Product Rule (p.121)
The Quotient Rule (p. 122)

Complete the reference table of <u>general derivative formulas</u> on the last page of this packet.

Flipped Math Calculus Version 1 https://calculus.flippedmath.com/version-1.html

Lesson 2.2 Defining the Derivative of a Function and Using Derivative Notation
Lesson 2.3 Estimating Derivatives of a Function at a Point
Lesson 2.5 Applying the Power Rule
Lesson 2.6 Derivative Rules: Constand, Sum, Difference, and Constant Multiple
Lesson 2.7 Derivatives of $\cos x$, $\sin x$, e^x, and $\ln x$
Lesson 2.8 The Product Rule
Lesson 2.9 The Quotient Rule
Lesson 2.10 Finding the Derivatives of $\tan x$, $\cot x$, $\sec x$, $\csc x$

<u>Integration and Integral Rules</u>

The Fundamental Theorem of Calculus, Parts 1 and 2 (p. 302, 307)

Complete the reference table of <u>general integral formulas</u> on the last page of this packet.

GENERAL DERIVATIVE FORMULAS	GENERAL INTEGRAL FORMULAS
$\frac{d}{dx}(C) =$	$\int du =$
$\frac{d}{dx}(x) =$	$\int kdu =$
$\frac{d}{dx}(kx) =$	$\int du + dv =$
$\frac{d}{dx}(u^n) =$	$\int u^n du =$
$\frac{d}{dx}(\ln\lvert u\rvert) =$	$\int \frac{du}{u} =$
$\frac{d}{dx}(\sin(u)) =$	$\int \sin(u)du =$
$\frac{d}{dx}(\cos(u)) =$	$\int \cos(u)du =$
$\frac{d}{dx}(\tan(u)) =$	$\int \sec^2(u)du =$
$\frac{d}{dx}(\sec(u)) =$	$\int \csc^2(u)du =$
$\frac{d}{dx}(\cot(u)) =$	$\int \sec(u)\tan(u)du =$
$\frac{d}{dx}(\csc(u)) =$	$\int \csc(u)\cot(u)du =$
$\frac{d}{dx}e^u =$	$\int \tan(u)du =$ $=$
$\frac{d}{dx}a^u =$	$\int \cot(u)du =$ $=$
$\frac{d\left(\sin^{-1}u\right)}{dx} =$	$\int e^u du =$
$\frac{d\left(\cos^{-1}u\right)}{dx} =$	$\int a^u du =$
$\frac{d\left(\tan^{-1}u\right)}{dx} =$	$\int \frac{du}{\sqrt{1-u^2}} =$
$\frac{d\left(\cot^{-1}u\right)}{dx} =$	$\int \frac{du}{1+u^2} =$
$\frac{d\left(\sec^{-1}u\right)}{dx} =$	$\int \frac{du}{u\sqrt{u^2-1}} =$
$\frac{d\left(\csc^{-1}u\right)}{dx} =$	