June, 2021

Dear Student and Parent(s),

Welcome to your 2021-2022 AP Calculus BC Class! You have electively enrolled in this college level course, where based on your performance on the AP exam in May 2022, you may earn college credits in calculus.

We will still be keeping the tradition of meeting every morning Monday through Thursday. The official start time is 7:30 a.m including the first day of school. Attendance will be tracked: 3 tardies accumulate to one absence. (Please, refer to the BKHS Parent and Student Handbook.) We need to meet the standardized curriculum by mid-April to be ready for the scheduled national test in May 2022. These advanced placement courses are very demanding and require additional classroom hours of instruction. A graphing calculator is required. While the TI-84 from your previous classes will work for many applications, in-class instruction will **use the TI-89**, which is **better suited for Calculus based mathematics** and is **highly recommended** for use in this course.

Calculus generalizes ideas and formulas from the constant to varying quantities. To move from the constant to the variable, it involves four stages: pre-calculus, the limit process, calculus formulations, and series expansions. Congratulations! You have successfully completed the first stage, and you have been introduced to the second phase. I am excited that you are willing to continue to study through the next stages meeting every Monday through Thursday morning at 7:30 a.m. and Fridays at 7:55. In order to be on task for the next stage, I have attached a review assignment due on the first day of class, Thursday, August 12th, 2021. This material reviews the major concepts from your previous math classes, and highlights the foundational material necessary to be successful in a college level calculus course. To ensure you are prepared, we will go over questions on this material, **and then there will be an assessment of your understanding**. See you **at 7:30am on the first day**.

Have a restful and productive summer. Manage your time wisely. I am looking forward to working with you next year!

Coach Curran

AP Calculus BC Teacher

Calculus BC - Review Assignment

Textbook: Hughes-Hallett, Gleason, McCallum, et al. Calculus Single Variable. Seventh Edition. John Wiley & Sons, 2017.

Reading

This class is based heavily on reading comprehension (know what a problem is asking), not just your ability to solve a problem. In keeping with maintaining a balance between concepts, modeling, and skills, the Calculus ideas in this textbook are presented graphically, numerically, symbolically, and **verbally** (the Rule of Four). Hence, I want you to read to help you build your Calculus vocabulary and to become familiarized with the textbook and the kinds of problems presented at the end of every section.

Reading Assignment

- Preface: Page X: "To Students: How to Learn from this Book"

Important Message From College Board

You should have successfully completed courses in which you studied algebra, geometry, trigonometry, analytic geometry, and elementary functions. In particular, you should understand the properties of linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise-defined functions, as well as sequences, series, and polar equations. You should know how to graph these functions and solve equations involving them. You should also be familiar with algebraic transformations, combinations, compositions, and inverses for general functions.

Flash Cards

As mentioned above, Calculus truly is a cumulative mathematics class where key problem solving skills and knowledge of properties and algebraic operations from previous classes is required in order to be successful. In addition, your verbal language skills are equally important in Calculus as your traditional problem solving skills. Below is a summary of the most important and commonly occurring vocabulary, formulae, graphs, properties, and concepts from your previous classes. Create Flash Cards for each topic, and I strongly encourage you to begin flipping through them once a week over the summer. The better you know these concepts the easier the year will be! Flash Cards will be checked on the first day of class along with the rest of the summer assignment.

1) Definition: Domain
2) Definition: Range
3) Definition: Average Rate of Change
4) Formula: Point Slope Equation of a Line
5) Definition: Increasing Function
6) Definition: Decreasing Function
7) Definition: Concave Up
8) Definition: Concave Down
9) Formula: Exponential Growth and Decay Equation
10) Even Functions
    a. Examples of Typical Functions
    b. Property of Even Functions
    c. Symmetry of Graph
11) Odd Functions
    a. Examples of Typical Functions
    b. Property of Odd Functions
    c. Symmetry of Graph
12) Function Notation
    a. Definition
    b. Interpreting Units
13) Inverse Functions
    a. Definition
    b. Notation
    c. Interpreting Units
14) Property: Exponent Product Rule
15) Property: Exponent Quotient Rule
16) Property: Exponent Power Rule
17) Property: Negative Exponent Rule
18) Property: Fractional Exponent (Roots) Rule
19) Property: Product Property of Natural Logarithms
20) Property: Quotient Property of Natural Logarithms
21) Property: Power Property of Natural Logarithms
22) Non-Calculator Evaluation: $\ln 1$
23) Non-Calculator Evaluation: $\ln e$
24) Parent Graph: Exponential Functions
25) Parent Graph: Logarithmic Functions
26) Parent Graph: Quadratic Functions
27) Parent Graph: Cubic Functions
28) Parent Graph: Absolute Value Functions
29) Parent Graph: Square Root Functions
30) Parent Graph: Sine Function
31) Parent Graph: Cosine Function
32) Parent Graph: Tangent Function
33) Formula: Pythagorean Theorem

34) Non-Calculator Evaluation: Soh-Cah-Tao
35) Non-Calculator Evaluation: Special Right Triangles (in radians)
36) Property: Converting Trigonometric Angles (Degrees and Radians)
37) Property: Trigonometric Reciprocal Identities
38) Property: Trigonometric Quotient Identities
39) Property: Trigonometric Pythagorean Identities
40) Formula: Trigonometric Double Angle Formulas
41) Formula: Polar to Rectangular Conversion Formulas
42) Parent Graph: Polar Circles
43) Parent Graph: Polar Rose Curves
44) Parent Graph: Polar Cardioids
45) Parent Graph: Polar Inner Loops
46) Parent Graph: Polar Dimples
47) Formula: Sum of an Infinite Geometric Series
48) Formula: Area of Rectangle
49) Formula: Area of a Triangle
50) Formula: Area of a Circle
51) Formula: Circumference of a Circle
52) Formula: Volume of a Cylinder
53) Formula: Volume of a Rectangular Solid
54) Formula: Distance Between Two Points
55) Formula: Factoring $a^2 - b^2$

Review Problems

NON-CALCULATOR

1. Find the Average Rate of Change for the functions $f(x) = 4x^2 - 3x + 2$ over the interval $[1, 4]$

2. Solve the Inequality $x^2 + 5x - 66 \le 0$. Write your answer in interval notation.

3. Decompose the Rational Expression into its fraction parts. $\dfrac{7}{x^2 - 6x + 8}$

4. Find the value of the infinite sum $\displaystyle\sum_{n=0}^{\infty} 18\left(\frac{1}{3}\right)^{n+2}$

5. Evaluate without a calculator $\sin\dfrac{\pi}{3}, \cos\dfrac{\pi}{2}, \tan\dfrac{\pi}{4}, \sin\pi, \cos\dfrac{5\pi}{6}, \sin\dfrac{3\pi}{2}$

6. For the polar equation $r = 4 + 4\sin\theta$; a) state the shape and symmetry of the graph, b) plot the equation (justify your graph with by showing specific points)

7. Convert the polar equation $r = 5\sin\theta$ into rectangular parametric equations.

CALCULATOR

8. Find the zeroes for the function $f(x) = \sqrt[3]{e^x - \sin x - 3}$

9. Find the intersection between the functions $f(x) = 2x - 3$ and $g(x) = 4e^{-x+1}$

Textbook Problems

Refer to your Calculus Textbook for the indicated problems

- p. 7 #1, 5, 18, 23, 34
- p. 19 #7, 8, 17, 27, 38
- p. 28 #1, 11, 14, 32, 43, 44
- p. 36 #1, 3, 5, 11, 13, 17, 18, 36
- p. 45 #2, 3, 6, 10, 59, 68
- p. 54 4, 8, 9, 10, 20, 22, 36, 48, 62