

# AB CALCULUS AP SUMMER REVIEW PACKET

Dear Students,

Welcome to your 2024-2025 AP Calculus AB Class! You have enrolled in this college level course where, based on your performance on the AP exam in May 2025, you may earn college credits in Calculus.

Calculus requires that students have a strong mastery of Algebra, Geometry, and Pre-Calculus skills. From there we can build upon the three main stages of Calculus: the limit process, derivative calculus, and integral calculus. In order to ensure that you are ready to explore these Calculus concepts, I have attached a review assignment **due on the first day of class**. 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 spend the first couple of days of school going over questions on this summer assignment and reviewing these necessary skills. Once we have completed the review, **we will have a graded test** to ensure you are ready to take on the challenge of Calculus.

I look forward to working with you this year!

Mr. Kevin Curran

NON-CALCULATOR: A calculator is not permitted on this worksheet.

1) Make physical copies of each of the flash cards given in the Quizlet linked below.

ALGEBRA, GEOMETRY, and TRIG REVIEW QUIZLET

<https://quizlet.com/817596846/algebra-geometry-and-trig-review-flash-cards/>

2) Non-Linear Inequalities: Solve the following by using a number line test/sign chart.

a)  $x^3 - 4x^2 \geq 5x$

b)  $\frac{x^2 - 4x + 4}{x} < 0$

3) Domain: State the domain of the following functions.

a)  $f(x) = x^3 + 1$

b)  $g(x) = \frac{x}{x^2 - 9}$

c)  $h(x) = \sqrt{25 - x^2}$

d)  $f(x) = \ln(x - 3)$

4) **Piecewise Functions:** Given the piecewise function  $f(x) = \begin{cases} x + 3, & x < -2 \\ -x^2 + 1, & -2 \leq x \leq 1 \\ 2x - 2, & x > 1 \end{cases}$ , find

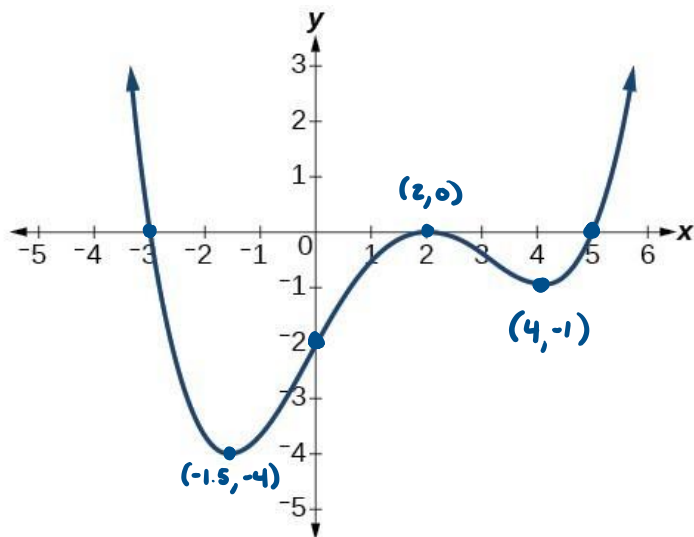
a)  $f(0)$

b)  $f(4)$

c)  $f(-2)$

5) **Graphical Analysis:** Use the graph of  $f(x)$ , shown below, to answer the following questions.

a) State the domain and range in interval notation.



b) State the intervals over which  $f$  is increasing and decreasing.

c) State the intervals over which  $f > 0$ .

d) State the intervals over which  $f < 0$ .

e) Find the average rate of change of  $f$  over  $[0, 5]$ . Show the work that leads to your answer.

**6) Rational Functions:** For each of the following rational functions find the  $x$  and  $y$ -intercepts, vertical asymptotes, and horizontal asymptotes.

a)  $g(x) = \frac{10-6x}{3x+1}$

b)  $h(x) = \frac{x-1}{x^2-4}$

**7) Equations of lines:**

a) Write the equation of the line that passes through the points  $(-3, 4)$  and  $(5, -2)$ .

b) Write the equation of the line that passes through the point  $(-1, 7)$  and is parallel to the line  $y = 3x + 5$ .

8) **Solving Non-Linear Systems:** Solve each of the systems of equations below.

$$\begin{aligned} \text{a) } y &= x^3 - 3x^2 + x \\ y &= -x \end{aligned}$$

$$\begin{aligned} \text{b) } x^2 + y^2 &= 20 \\ y &= x + 2 \end{aligned}$$

9) **Trigonometric Functions:** Evaluate each of the trigonometric functions below without a calculator.

$$\text{a) } \sin\left(\frac{2\pi}{3}\right) =$$

$$\text{b) } \sec\left(\frac{5\pi}{6}\right) =$$

$$\text{c) } \cos\left(-\frac{5\pi}{3}\right) =$$

$$\text{d) } \tan\left(\frac{3\pi}{4}\right) =$$

$$\text{e) } \sin\left(\frac{\pi}{2}\right) =$$

$$\text{f) } \csc(\pi) =$$

**10) Trigonometric Equations:** Find the solution to each of the following trigonometric equations.

a)  $2 \sin x - 1 = 0$

b)  $\cos x \sin x - \cos x = 0$

**11) Exponentials:** Solve the following exponential equations.

a)  $2e^{x-1} + 3 = 15$

b)  $x^2 e^x - 4e^x = 0$

**12) Logarithms:**

a) Solve:  $\ln(x + 2) - 2 = 0$

b) Simplify:  $\ln 16 - \ln 8 + \ln 1 + 4 \ln e$

**13) Function Notation:** Find each indicated value.

a)  $f(x) = x^{-\frac{4}{3}} - x$ , find  $f(8)$

b)  $f(x) = \frac{(x^2-1) \cdot \frac{1}{\sqrt{x}} - 2x \cdot 2\sqrt{x}}{(2\sqrt{x})^2}$ , find  $f(9)$