

AP Calculus BC
Classroom Code: 4n4jybss
Summer Work

Welcome to AP Calculus BC! This fast-paced and vigorous course will cover topics utilized in both Calculus I and Calculus II. Topics and material covered throughout your Pre-Calculus courses will be used extensively and expected to be known. Therefore, the completion and understanding of this assignment will be very beneficial. The purpose of this assignment is to provide you with an introduction to the course and will aid in a strong start in September. It is recommended that you obtain a TI-84 Calculator for this course. Much of the material we will cover will be completed on the calculator and will be necessary for homework assignments and on the AP Exam.

Every student in this class will be expected to complete this summer assignment. ***A brief homework quiz will be given on the first day of class (so bring your completed packet!).*** Therefore, it is important that you complete this packet to the best of your abilities. You may need to research some of the topics on your own in order to complete the summer assignment. Please use your resources wisely during your research. You can also email me at cwendland@rbrhs.org or at cwendland@teachers.rbrhs.org.

Directions: Answer the following questions using exact values, i.e.: fractions, radicals, π , e , $\ln$. Be sure to show your work.

I. Linear Equations

A. Write the equation of the line in both forms using a slope and a point:

1. $m = \frac{2}{3}$ and $P(3, 5)$

a) Point Slope:

b) Slope Intercept:

2. $m = -\frac{4}{5}$ and $P(1, 2)$

a) Point Slope:

b) Slope Intercept:

II. Functions and Inverses

A. Find the domain of the function $f(x) = \frac{3x+1}{\sqrt{x^2+x-2}}$

B. Let $f(x) = \frac{|x|}{x}$. Show that $f(x) = \begin{cases} 1, & x > 0 \\ -1, & x < 0 \end{cases}$

C. Given $f(x) = \{(3, 5), (2, 4), (1, 7)\}$, $g(x) = \sqrt{x - 3}$,
 $h(x) = \{(3, 2), (4, 3), (1, 6)\}$, $k(x) = x^2 + 5$, find:

1. $f(h(3)) =$

2. $g(k(7)) =$

D. Find the points of intersection of the graphs of $y = x^2 - 3x - 4$ and
 $y = 5x + 11$.

III. Exponents & Logarithms

A. Simplify:

1. $x^{\frac{3}{2}}(x + x^{\frac{5}{2}} - x^2)$

2. $(5a^{\frac{2}{3}})(4a^{\frac{3}{2}})$

3. $\left(4a^{\frac{5}{3}}\right)^{\frac{3}{2}}$

4. $e^{\ln 3}$

5. $e^{1+\ln x}$

6. $e^{3\ln x}$

7. $\ln\left(\frac{1}{2}\right)$

8. $\ln(\sqrt{e})$

9. $\ln\left(\frac{1}{e^x}\right)$

B. Solve for y: $\ln y = 2t - 3$

C. Solve for k: $e^{3k} = 5$

IV. Trigonometry

A. Evaluate:

1. $\sin \frac{(5\pi)}{4}$

$$2. \tan \frac{(5\pi)}{3}$$

$$3. \cos \frac{(5\pi)}{6}$$

$$4. \tan^{-1}(-1)$$

$$5. \sin^{-1}(-1)$$

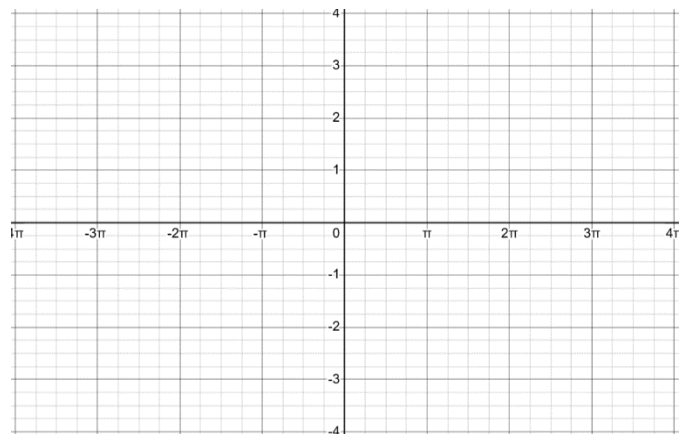
$$6. \cos^{-1}(-1)$$

B. Solve: $3\sin^2 x = \cos^2 x$, $[0, 2\pi)$

C. Sketch the graph of one period of each function. Include a scale on each axis and plot 5 key points. Plot them on the same graph in different colors.

$$1. y = \sin\left(x - \frac{\pi}{4}\right) - 1$$

$$2. y = 3\sin\left(\frac{x}{2}\right)$$



V. Limits

A. Determine if the limit exists and, if so, find the limit.

1. $\lim_{x \rightarrow \infty} \frac{3x^5 - 5x^2 + 1}{4x^5 + 9x^3 - 2x}$

2. $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

3. $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$

4. $\lim_{x \rightarrow 2} \frac{1}{x - 2}$

5. $\lim_{x \rightarrow \infty} \frac{e^x}{x^2}$

VI. Rational Functions and Asymptotes

A. Find the domain and range, vertical and horizontal asymptotes, and sketch the graph of:

1. $g(x) = \frac{5x-3}{2x+1}$

2. $h(x) = \frac{3x^2-3x}{x^2+x-12}$

VII. BC Specific

A. Simplify: $\frac{3(n+1)!}{5n!}$

B. Polar: Sketch the graph of each of the following with the assistance of your calculator:

1. $r = 4$

2. $r = 1 + \sin \theta$

3. $r = 2\cos \theta$

4. $r = 2\cos 3\theta$

C. Write as a single equation in x and y: $\begin{cases} x = \sin t \\ y = \cos t \end{cases}$