

AP Calculus BC Summer Assignment:

Your summer assignment will be due on the first day of school.

****For each day late, 5 points will be deducted from the total value.****

All work must be done in pencil and be done on notebook paper. All work must be shown in order to receive full credit.

Welcome to AP Calculus BC!

This is an exciting, challenging, fast paced course that is taught at the college level. We have a lot of material to cover before the AP exam in May, and, as such, we cannot spend a lot of time in class reviewing pre-requisite material. This mandatory packet is designed to review much of that material for you. Spend time working on this over the summer. If you struggle with specific areas, use your old notes and/or the internet as a resource. You can also email me if you have any questions - mclark@nazarethacademyhs.org . Do not wait until last minute to complete this assignment which means I should not receive emails about this packet the week school starts. The majority of this packet should be completed without a calculator, although there are few sections that will indicate calculator use is expected. This assignment will be reviewed and marked as homework but there will be a quiz based on the summer assignment material on the first week of classes (date to be determined).

A couple of items that you should be aware of:

1. Know your trig! You should know your unit circle. Trigonometry will often show up in the middle of a problem and the faster you are with your facts, the better equipped you will be to solve problems.
2. Know your basics from exponential and logarithmic functions (know that $\ln e = 1$, $\ln 1 = 0$ and log has an understood base of 10, etcetera.)
3. Know your double angle identities for sine and cosine. Know your (3) trig pythagorean identities, and know your reciprocal identities.

Materials:

Here are a few things you should be prepared to have - not necessarily the first day of school - but within the first week:

- 1 large 3 ring binder (1.5" or more)
 - Dividers (recommended)
- Pencils, pens, erasers, highlighters
- Notebook paper
- TI-83, TI-84, or TI-89 Calculator
- Ruler (6" is recommended)
- Laptop or Electronic Device (iPad with keyboard)

Overall, my wish is that you gain an understanding and appreciation of the concepts presented in this course and be able to step confidently into your next mathematics classrooms.

Section 1: Algebraic Review

1.) Solve $xy + 2x + 1 = y$ for y .

2.) Factor $x^2(x - 1) - 4(x - 1)$

3.) Solve $\ln(y - 1) - \ln = x + \ln x$ for y

4.) Factor $3x^{\frac{3}{2}} - 9x^{\frac{1}{2}} + 6x^{-\frac{1}{2}}$

Simplify each expression.

5.) $\frac{(x^2)^3 x}{x^7}$

6.) $\sqrt{x} \cdot \sqrt[3]{x} \cdot x^{\frac{1}{6}}$

7.) $\frac{5(x+h)^2 - 5x^2}{h}$

8.) $\frac{\frac{1}{x} + \frac{4}{x^2}}{3 - \frac{1}{x}}$

Simplify by rationalizing the numerator.

9.) $\frac{\sqrt{x+9}-3}{x}$

10.) $\frac{\sqrt{x+h}-\sqrt{x}}{h}$

Section 2: Trigonometry Review

Use your knowledge of the unit circle to evaluate each of the following. You MUST know your unit circle. Leave answers in radical form. Do NOT use your calculator.

11.) $\sin 30^\circ$

12.) $\cos \frac{2\pi}{3}$

13.) $\tan 45^\circ$

14.) $\sin(-\frac{\pi}{6})$

15.) $\tan \pi$

16.) $\cos \frac{5\pi}{6}$

17.) $\cos(90^\circ)$

18.) $\cos \frac{3\pi}{4}$

19.) $\cot \frac{\pi}{6}$

20.) $\cos^{-1}(\frac{1}{2})$

21.) $\sin^{-1}(\frac{\sqrt{2}}{2})$

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

Solve each trigonometric equation for $0 \leq x \leq 2\pi$.

23.) $\sin x = \frac{\sqrt{3}}{2}$

24.) $\tan^2 x = 1$

25.) $\cos \frac{x}{2} = \frac{\sqrt{2}}{2}$

26.) $2\sin^2 x + \sin x - 1 = 0$

27.) $3\cos x + 3 = 2\sin^2 x$

Solve each exponential or logarithmic equation.

28.) $5^x = 125$

29.) $8^{x+1} = 16^x$

30.) $81^{\frac{3}{4}} = x$

31.) $8^{-\frac{2}{3}} = x$

32.) $\log_2 32 = x$

33.) $\log_x \frac{1}{9} = -2$

34.) $\log_4 x = 3$

35.) $\log_3(x + 7)x = \log_3(2x - 1)$

Expand each of the following using the law of logs.

36.) $\log_3 5x^3$

37.) $\ln \frac{5x}{y^2}$

38.) $2\ln\sqrt{y} - \frac{1}{2}\ln y^4 + \ln 2y$

Section 3: Average Rate of Change Review

- 39.) Find the average speed of a car that has traveled 350 miles in 7 hours.
- 40.) Suppose $f(1) = 2$ and the average rate of change of f between 1 and 5 is 3. Find $f(5)$.
- 41.) The position $p(t)$, in meters, of an object at time t , in seconds, along a line is given by $p(t) = 3t^2 + 1$.
- Find the change in position between times $t = 1$ and $t = 3$.
 - Find the average velocity of the object between times $t = 1$ and $t = 4$.
 - Find the average velocity of the object between any time t and another time $t + \Delta t$

Section 4: Inverse Functions

- 42.) Algebraically find the inverse of $y = \frac{3}{x-2} - 1$
- 43.) If $f(x) = x^3 - 1$, find f^{-1} and verify that $f(f^{-1}(x)) = f^{-1}(f(x)) = x$.
- 44.) Discuss the relationship between the domain and range of a function and its inverse.
- 45.) Given the one-to-one function f . The point (a,c) is on the graph of f . Give the coordinates of a point on the graph of f^{-1} .
- 46.) Discuss the relationship between the graph of a function and the graph of its inverse. You can use an example to illustrate your answer.

Section 5: Asymptotes

Find the vertical asymptotes (if any) of the graph of the function.

47.) $f(x) = \frac{1}{x^2}$

48.) $f(x) = \frac{x^2}{x^2-4}$

49.) $g(t) = \frac{t-1}{t^2+1}$

50.) $s(t) = \frac{t}{\sin t}$

Congratulations! You've completed your AP Calculus BC Summer Assignment! Make sure to review these concepts as well as derivatives, integrals, and limits!