Summer Work for AP Calculus AB 2022-2023

I am looking forward to working with you next year in Calculus. This is the cover of a packet. The packet is due on the first day of school. Try to find the correct answers using algebraic methods—not calculators. If you cannot get an answer at first, don't stress out, just try your best and show your work. If all else fails, get out your calculator to complete the problem. Feel free to discuss with friends. However, just getting the answers from someone will not be beneficial. These questions and topics are specifically chosen as a review for the upcoming course. These topics are used frequently in AP Calculus and there will not be time to re-teach them all during the year. The first week of school is set aside to refresh your memory and after that you will need to keep this handy to refer back to it.

Typically, AP Calculus students use the TI-89 calculator. We have a large supply of TI-89s to issue to students for use during the school year. However, if you want to buy your own, you may be able to find a good used one on eBay. If you are buying one you may consider buying either the TI-89 or the TI-Nspire CAS. The Nspire is a more updated calculator which charges rather than using batteries. [Be sure to get the **CAS.]** However, the Class of 22, seemed to predominantly use their TI-84's and did fine. I do not care which calculator you use, but want to be sure you are aware that the other two calculators will do algebra, and may be preferred.

We will begin in August with a brief recap of the Pre-Calc material. Plan to take a test over Pre-Calculus material *by Wednesday of the second week of school.* **This packet is due on the first day of school.**

Timeline for the **first test grade** in Calculus AB:

August 4th (day 1): You will take the first portion of the test; this will be over the Unit Circle in which you will be required to have the Unit Circle memorized and be able to answer trigonometric value questions based on the Unit Circle. If you have to draw a picture, you do not know these values well enough. This will be worth **30** points.

August 4th (day 1): Your summer work packet should be completed.

August 5th – August 9th (day 2, day 3, day 4): I will answer questions about the summer work during class and before school as needed.

August 10th (day 5): We will take a test over the summer review material. The test will consist of calculator and no calculator questions. This will be worth **70** pts.

Together all these parts make for the first **100**-point test grade.

See you in the fall. Have a great summer. If you have any questions, feel free to contact me by email:

sweatman.melinda@fcboe.org

Equations of LINES

We write equations of lines every single week until May! Let's all get used to using the **point-slope method:**

Slope intercept form: $y = mx + b$

Point-slope form: $y - y_1 = m(x - x_1)$

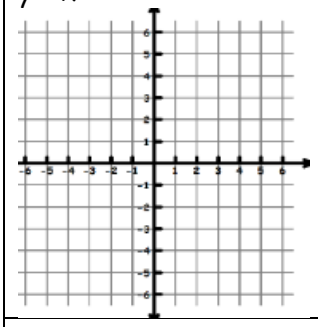
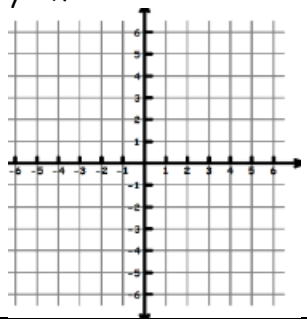
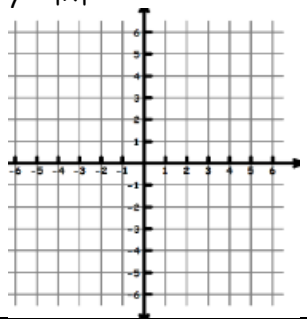
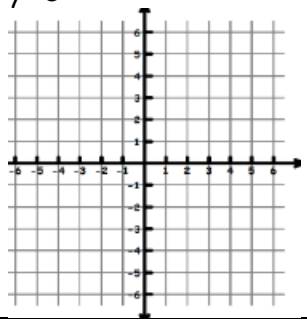
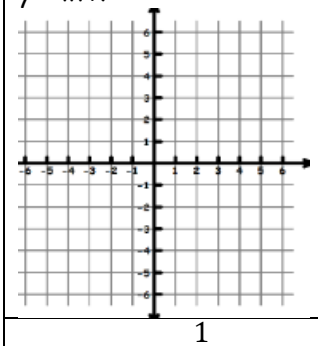
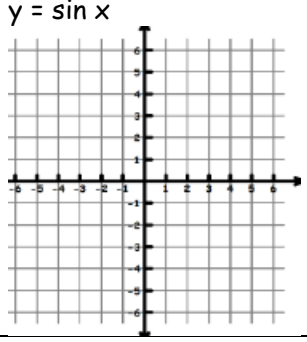
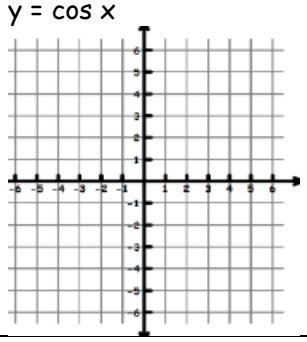
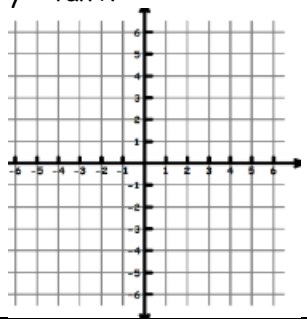
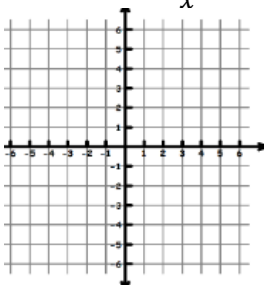
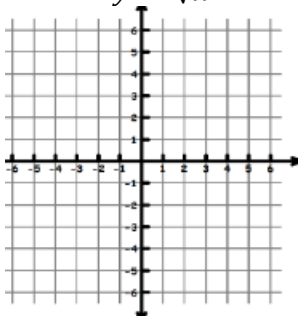
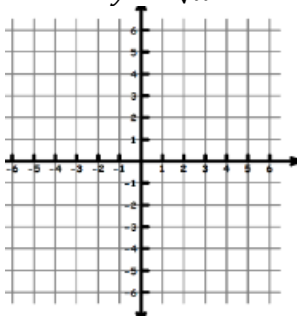
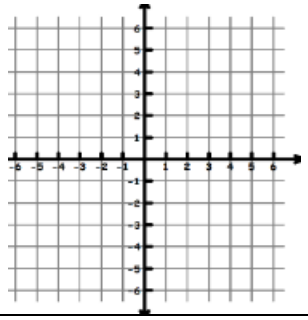
Vertical line: x = c (slope is undefined)

Horizontal line: y = c (slope is 0)

Find the equation of the line that:

1. has a slope of 3 and y intercept of 5.
2. passes through (5, -3) with an undefined slope.
3. passes through (-4, 2) with a slope of 0.
4. passes through (2, 8) and is parallel to $y = \frac{1}{2}x - 1$.
5. passes through (4, 7) and is perpendicular to the y-axis.

BASIC Parent Function graphs: Know these COLD! Be sure you are fully aware of intervals inc/dec, zeros, and end behavior of these graphs.

$y = x^2$ 	$y = x^3$ 	$y = \lvert x \rvert$ 	$y = e^x$ 
$y = \ln x$ 	$y = \sin x$ 	$y = \cos x$ 	$y = \tan x$ 
$y = \frac{1}{x}$ 	$y = \sqrt{x}$ 	$y = \sqrt[3]{x}$ 	*Did I say **y = ln x?** YES!! KNOW this!!! 

Composition of Functions

Let $f(x) = 2x + 1$ and $g(x) = 2x^2 - 1$. Find each:

1. f (2)
2. f (m + 1)
3. f [g (-2)]
4. g [f(k + 2)]
5. $\frac{f(x+h)-f(x)}{6}$

Let $f(x) = x^2$, $g(x) = 2x + 5$, and $h(x) = x^2 - 1$

6. h[f(-2)]
7. f[g(x - 1)]

Logs

Know these values COLD!

Ln 1 = _____ Ln e =____ Ln 0 =_____

There are three log properties

Log a + Log b =

= Log $\frac{a}{b}$

a Ln b =

Be able to solve equations: (LEAVE EXACT ANSWER)

1. $3 + 4e^x = 8$
2. $3^{2x-1} = 15$
3. $log_4(x + 3) + log_4(x - 4) = log_4 8$
4. $log_{64} x - log_{64} 7 = \frac{1}{2}$
5. $log \frac{15}{x} = 2$
6. $ln\,(x + 5) = 8.3$

Asymptotes

Vertical: what makes the bottom zero—but not a hole. (Know the difference)

Horizontal: BOBO BOTN EATSDC

Find all asymptotes:

1. $\frac{3x^2 - 12x}{x^2 - 2x - 3}$
2. $\frac{x^3 - 9x}{3x^2 - 6x - 9}$
3. $\frac{2x-1}{x^2+5x-6}$

Unit Circle **we use this E V E R Y U N I T**

1. sin $\frac{\pi}{6}$ 2. Cos $\frac{3\pi}{4}$ 3. Tan $\frac{\pi}{3}$ 4. Csc $\frac{7\pi}{6}$ 5. sin $\frac{\pi}{3}$

6. cos 2π 7. Tan $\frac{5\pi}{3}$ 8. Sec $\frac{5\pi}{4}$ 9. Sin $\frac{7\pi}{4}$

Inverse Trig

There is only ONE correct answer! There is a restricted domain in order for this to be a function. $sin^{-1}x$ and $tan^{-1}x$ are only defined from -$\frac{\pi}{2}$ and $\frac{\pi}{2}$. $cos^{-1}x$ is only defined from 0 to π. This is spring 2022! Other than that, it is unit circle backwards. Again, there is only **one** correct answer.

This is one topic that trips Calculus students up A L L Y E A R !!!

7. arcsin (-1/2) 8. $\arccos\left(-\frac{1}{2}\right)$ 9. $\arctan\left(-\frac{\sqrt{3}}{3}\right)$

10. $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ 11. $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ 12. $\tan^{-1}(-1)$

13. $\sin^{-1}0$ 14. $\cos^{-1}0$ 15. $\tan^{-1}\left(-\sqrt{3}\right)$

Trig equations: **Find all solutions for x : [0, 2π)**

1. sin x = -1/2 2. Cos 2x = $\frac{\sqrt{3}}{2}$ 3. $tan^2x - 3 = 0$

Trig graphs: **Sketch one period of the function. Label both axes.**

1. y = 5 sin x 2. Y = cos 2x 3. Y = 2 cos x - 3

<u>Trig Identities</u> **Know double angles for sin and cos and all Pythagorean Identities.**

Verify:

1. $\frac{\cot x}{\csc x} = \cos x$ 2. $(\sin x + \cos x)^2 + (\sin x - \cos x)^2 = 2$

3. $2\cos^2 x + \sin^2 x = \cos^2 x + 1$

4. $\tan x + \cot x = \sec x \csc x$ 5. $\sin 2x - \cos x = \frac{2\sin x - 1}{\sec x}$

Sin 2x =

Cos 2x=

Cos 2x =

Cos 2x =

3 Pythagorean Identities