

NAME: _____ DATE: _____ CLASS: _____

AP CALCULUS AB SUMMER MATH 2022

A) Refer to your pre-calculus notebook, the internet, or the sheets/links provided for assistance.

B) Do not wait until the last minute to complete this assignment.

C) Write neatly and in pencil on your own paper. Number all work as it is numbered.

D) Show your work (step-by-step solutions). Circle your final answers.

E) Round decimal answers to the nearest thousandth.

F) Do your own work, and complete all problems.

G) Place a question mark next to problems you have difficulty with computing. Watch a You Tube video for review.

H) Answers will be posted. Bring your summer math assignment with you the first day of school. A test on this material will be given during the first week of school. This test will be the first grade of the course in the first nine weeks for 2022-2023 school year.

You may find some of the websites useful. For certain information, you may want to print and keep a copy in your notebook for future reference.

http://tutorial.math.lamar.edu/pdf/Trig_Cheat_Sheet.pdf

<http://www.mathbits.com/MathBits/TeacherResources/PreCalculus/Formula%20Sheet2.pdf>

<http://www.khanacademy.org>

<http://www.math.ucdavis.edu/~marx/precalculus.html>

<http://justmathtutoring.com/>

<http://jamesrahn.com/>

http://www.stewartcalculus.com/media/4_home.php

http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/index.htm

<https://www.youtube.com/c/patrickjmt>

<https://www.purplemath.com/modules/index.htm>

1) **COMPLEX FRACTIONS:** Simplify each of the following.

a) $\frac{\frac{25}{a}-a}{5+a}$ b) $\frac{4-\frac{12}{2x-3}}{5+\frac{15}{2x-3}}$ c) $\frac{\frac{x}{x+1}-\frac{1}{x}}{\frac{x}{x+1}+\frac{1}{x}}$

2) **SIMPLIFYING EXPRESSIONS:** Write answers with positive exponents only.

a) $\frac{\frac{2}{x^2}}{\frac{10}{x^3}}$ b) $\frac{12x^{-3}y^2}{18xy^{-1}}$ c) $(4a^{5/3})^{3/2}$ d) $x^{3/2}(x + x^{5/2} - x^2)$ e) $\frac{5-x}{x^2-25}$

3) Expand using **PASCAL'S TRIANGLE**. $(x - 2y)^5$

4) **FUNCTIONS:** Let $f(x) = x^2$, $g(x) = 2x + 5$, $h(x) = x^2 - 1$. Find each.

a) $h[f(-2)]$ b) $f[g(x - 1)]$ c) $g[h(x^3)]$

Find $\frac{f(x+h)-f(x)}{h}$ for the given function, $f(x)$. d] $f(x) = 9x + 3$ e] $f(x) = 5 - 2x$

5] **INTERCEPTS:** For the x-intercepts and y-intercepts for each.


a] $y = x^2 + x - 2$

6] **POINTS OF INTERSECTION:** Find the point(s) of intersection of the graphs algebraically.

a] $x + y = 8$ and $4x - y = 7$ b] $x^2 + y = 6$ and $x + y = 4$

7] **INTERVAL NOTATION, SET-BUILDER NOTATION, INEQUALITIES, & GRAPHS**

Complete the table with the appropriate notation or graph.

Solution	Interval Notation	Graph
$-2 < x \leq 4$		
	$[-1, 7)$	
		

8] **DOMAIN AND RANGE**

Find the domain and Range of each function. Write your answer in interval notation.

a] $f(x) = x^2 - 5$ b] $f(x) = -\sqrt{x + 3}$ c] $f(x) = 3 \sin(x)$ d] $f(x) = \frac{2}{x-1}$

9] **INVERSE OF A FUNCTION:** Find the inverse for each function.

a] $f(x) = 2x + 1$ b] $f(x) = \frac{x^2}{3}$

Prove $f(x)$ and $g(x)$ are inverses of each other using compositions.

c] $f(x) = \frac{x^3}{2}$ and $g(x) = \sqrt[3]{2x}$ d] $f(x) = 9 - x^2, x \geq 0$ and $g(x) = \sqrt{9 - x}$

10] **EQUATIONS OF LINES**

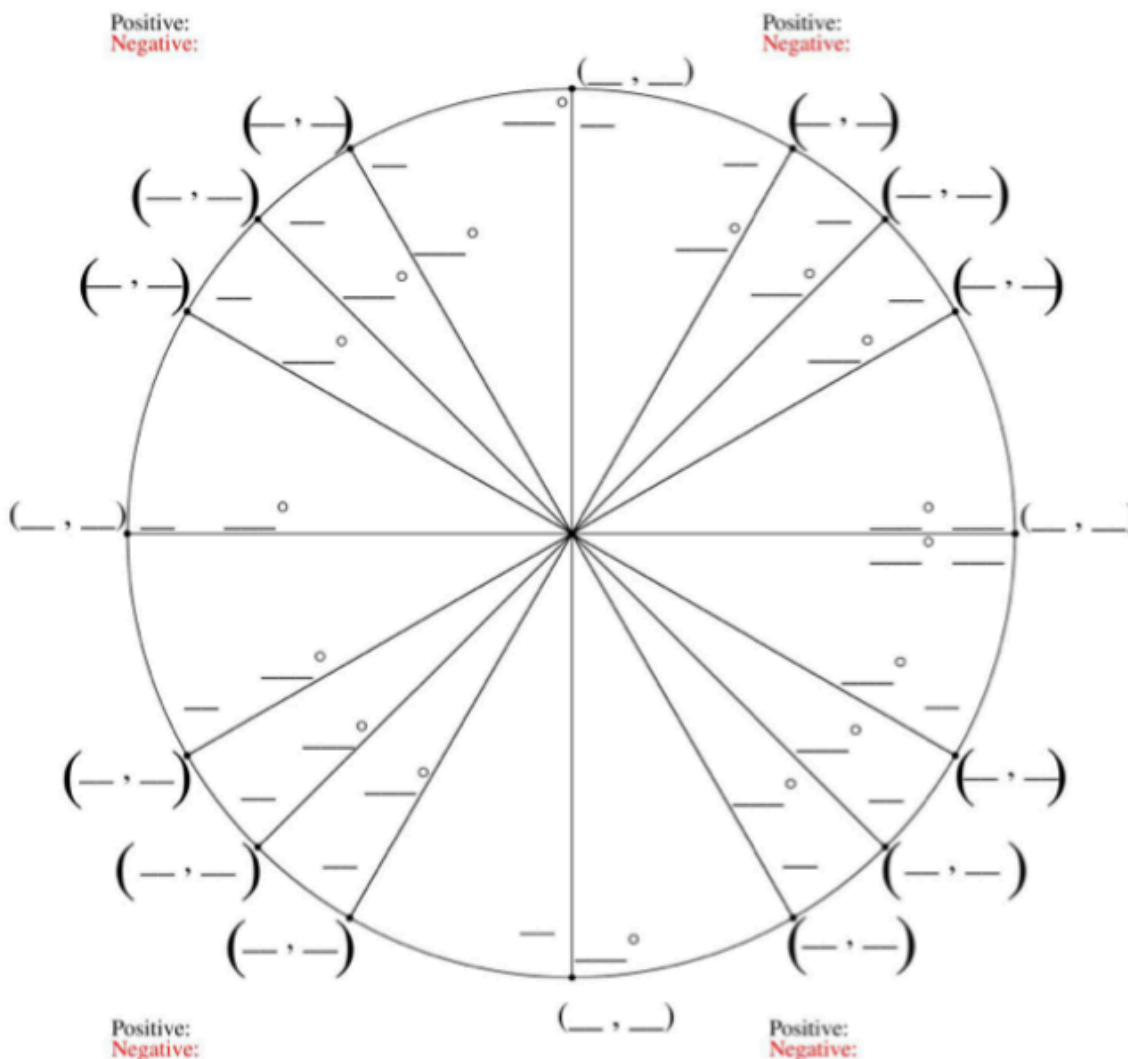
- a] Determine the equation of a line passing through (5, -3) with an undefined slope.
- b] Determine the equation of a line passing through (-4, 2) with a slope of 0.
- c] Find the equation of a line passing through (2, 8) and perpendicular to $y = \frac{5}{6}x - 1$.
- d] Find the equation of a line passing through (0, 5) and parallel to a line with a slope of $\frac{2}{3}$.
- e] Find the equation of a line with an x-intercept of (2, 0) and a y-intercept of (0, 3).

11] **RADIAN & DEGREE MEASURES**

Convert to degrees. a] $\frac{5\pi}{6}$ b] $\frac{4\pi}{5}$

Convert to radians. c] 45° d] -17° e] 237°

12] Fill in the unit circle with the ordered pair, degree, and radian.



13] **UNIT CIRCLE**

You must have these memorized OR know how to calculate their values without a calculator.

- | | | | | | |
|-----------------|--------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|
| a] $\sin(\pi)$ | b] $\cos\left(\frac{3\pi}{2}\right)$ | c] $\sin\left(-\frac{\pi}{2}\right)$ | d] $\sin\left(\frac{5\pi}{4}\right)$ | e] $\cos\left(\frac{\pi}{4}\right)$ | |
| f] $\cos(-\pi)$ | g] $\cos\left(\frac{\pi}{3}\right)$ | h] $\sin\left(\frac{5\pi}{6}\right)$ | i] $\cos\left(\frac{2\pi}{3}\right)$ | j] $\tan\left(\frac{\pi}{4}\right)$ | |
| k] $\tan(\pi)$ | l] $\tan\left(\frac{\pi}{3}\right)$ | m] $\cos\left(\frac{4\pi}{3}\right)$ | n] $\sin\left(\frac{11\pi}{6}\right)$ | o] $\tan\left(\frac{7\pi}{4}\right)$ | p] $\sin\left(-\frac{\pi}{6}\right)$ |

14] **TRIGONOMETRIC EQUATIONS:** Solve each of the equations for $0 \leq x < 2\pi$.

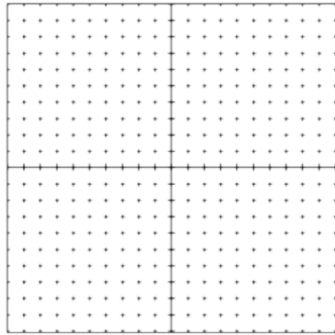
a] $\sin(x) = -1/2$

b] $2 \cos(x) = \sqrt{3}$

c] $4\sin^2 x = 3$

d] $2\cos^2 x - 1 - \cos x = 0$ (Hint: Factor)

15] **PIECEWISE FUNCTION:** Graph the function. Indicate the domain and range.



$$f(x) = \begin{cases} x^2, & x < 0 \\ x + 2, & 0 \leq x \leq 3 \\ 4, & x > 3 \end{cases}$$

16] **TRANSFORMATIONS**

a] Given $f(x) = x^2$ and $g(x) = (x - 3)^2 + 1$. Describe the transformations.

b] Write a new function, $g(x)$, for $f(x) = x^3$ translated six units left and reflected over the x-axis.

c] If the ordered pair (2, 4) is on the graph of $f(x)$, find one ordered pair that will be on the following functions:

i] $f(x) - 3$

ii] $f(x - 3)$

iii] $2f(x)$

iv] $f(x - 2) + 1$

v] $-f(x)$

17] **EXPONENTIAL FUNCTIONS:** Solve for x.

a] $3^{3x+5} = 9^{2x+1}$

b] $\left(\frac{1}{9}\right)^x = 27^{2x+4}$

c] $\left(\frac{1}{6}\right)^x = 216$

18] **LOGARITHMS:** Evaluate.

a] $\log_7 7$

b] $\log_3 27$

c] $\log_2 \left(\frac{1}{32}\right)$

d] $\log_{25} 5$

e] $\log_9 1$

f] $\log_4 8$

g] $\ln \sqrt{e}$

h] $\ln \left(\frac{1}{e}\right)$

19] **PROPERTIES OF LOGARITHMS:** Use the properties of logarithms to evaluate the following.

a] $\log_2 2^5$

b] $\ln e^3$

c] $\log_2 8^3$

d] $\log_3 \sqrt[5]{9}$

e] $2^{\log_2 10}$

f] $e^{\ln 8}$

g] $9 \ln e^2$

h] $\log_9 9^3$

i] $\log_{10} 25 + \log_{10} 4$

j] $\log_2 40 - \log_2 5$

k] $\log_2 (\sqrt{2})^5$

20] **SOLVE LOGARITHMIC EQUATION**

- a] $\ln(e^3) = x$ b] $\ln(e^x) = 4$ c] $\ln(x) + \ln(x) = 0$ d] $e^{\ln 5} = x$
- e] $\ln(1) - \ln(e) = x$ f] $\ln(6) + \ln(x) - \ln(2) = 3$ g] $\ln(x+5) = \ln(x-1) - \ln(x+1)$

21] **EVEN AND ODD FUNCTIONS**

State whether the graphs are even, odd, or neither. Show your work.

- a] $f(x) = 2x^4 - 5x^2$ b] $g(x) = x^5 - 3x^3 + x$ c] $h(x) = 2x^2 - 5x + 3$
- d] $j(x) = 2\cos(x)$ e] $k(x) = \sin(x) + 4$

22] **VERTICAL ASYMPTOTES:** Determine all vertical asymptotes.

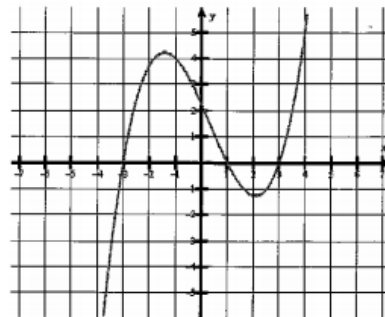
- a] $f(x) = \frac{1}{x^2}$ b] $f(x) = \frac{x^2}{x^2-4}$ d] $f(x) = \frac{x-1}{x^2+x-2}$

23] **HORIZONTAL ASYMPTOTES:** Determine all horizontal asymptotes.

- a] $f(x) = \frac{x^2-2x+1}{x^3+x-7}$ b] $f(x) = \frac{5x^3-2x^2+8}{4x-3x^3+5}$

24] The graph of the function f is given.

- A] State the domain of f .
 B] State the range of f .
 C] Estimate the values of x such that $f(x)=0$.
 D] On which intervals is f increasing?
 E] On which intervals is f decreasing?



25] **PARENT FUNCTIONS**

Know the parent functions studied in Algebra 1, Algebra 2, and Pre-Calculus. Know the key characteristics of each.

Identity	Linear	Quadratic	Cubic	Quartic	
Absolute Value	Square Root	Cubed Root	Exponential	Logarithmic	
Greatest Integer	Rational/Reciprocal	Piecewise	Quintic	Cotangent	
Sine	Cosine	Tangent	Secant	Cosecant	Constant