

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_ CLASS: \_\_\_\_\_

AP CALCULUS AB SUMMER MATH 2019

- 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.
- G] Answers will be posted the first week of August. 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 2019-2020 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://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.stewartcalculus.com/media/4_home.php)

[http://www.wtamu.edu/academic/anns/mps/math/mathlab/col\\_algebra/index.htm](http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/index.htm)

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

a]  $\frac{25-a}{5+a}$       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]  $(4a^{\frac{5}{3}})^{\frac{3}{2}}$       d]  $x^{\frac{3}{2}}(x+x^{\frac{5}{2}}-x^2)$       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]  $y = x^2 + x - 2$       b]  $y = x\sqrt{16-x^2}$       c]  $y^2 = x^3 - 4x$

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)  $f(x) = 3 \sin \sin(x)$     d)  $f(x) = \frac{2}{x-1}$

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

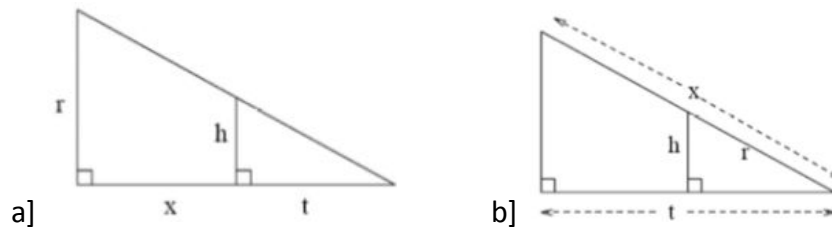
a)  $f(x) = 2x + 1$     b)  $f(x) = \frac{x^2}{3}$

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) SIMILAR TRIANGLES**

Express  $x$  in terms of the other variables in the picture.



**11) EQUATIONS OF LINES**

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

**12) USING THE GRAPHING CALCULATOR**

You should be able to a) graph an arbitrary function, b) find zeros of a function, and c) find the intersection between two functions. Draw a sketch and indicate the window used.

Find all roots to the nearest thousandth.

a]  $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$

b]  $f(x) = 3 \sin \sin (2x) - 4x + 1, [-2\pi, 2\pi]$  (Hint: For trig. functions use radian mode.)

c]  $f(x) = 0.7x^2 + 3.2x + 1.5$

d]  $f(x) = x^4 - 8x^2 + 5$

f] Find the coordinates of any points of intersection.  $f(x) = x^2 - 5x + 2, g(x) = 3 - 2x$

**13] RADIAN & DEGREE MEASURES**

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

b]  $\frac{4\pi}{5}$

Convert to radians. c]  $45^\circ$

d]  $-17^\circ$

e]  $237^\circ$

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



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

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

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

- a]  $\sin \sin (x) = -1/2$  b]  $2 \cos \cos (x) = \sqrt{3}$   
 c]  $4 \sin^2 x = 3$  d]  $2 \cos^2 x - 1 - \cos x = 0$  (Hint: Factor)

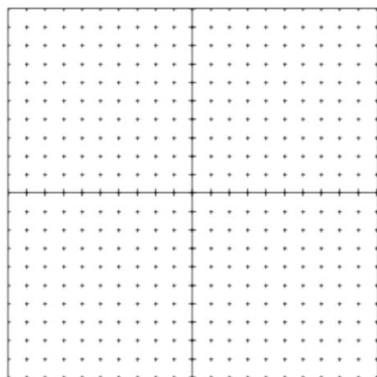
17] **PARENT FUNCTIONS**

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

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



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

19] **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]  $-f(x)$

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

- a]  $3^{3x+5} = 9^{2x+1}$  b]  $\left(\frac{1}{9}\right)^x = 27^{2x+4}$  c]  $\left(\frac{1}{6}\right)^x = 216$

- 21] **LOGARITHMS:** Evaluate. a] 7 b] 27 c]  $\left(\frac{1}{32}\right)$  d] 5  
 e] 1 f] 8 g]  $\ln \ln \sqrt{e}$  h]  $\ln \ln \left(\frac{1}{e}\right)$

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

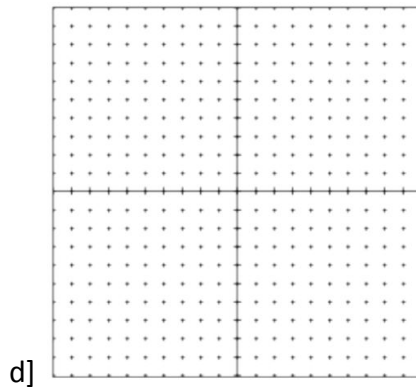
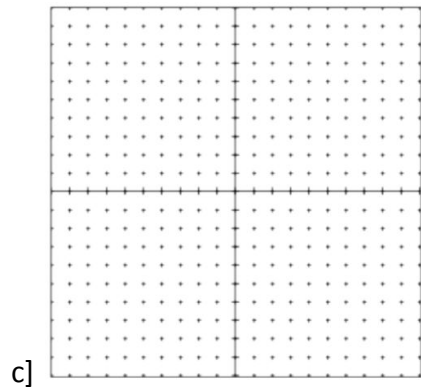
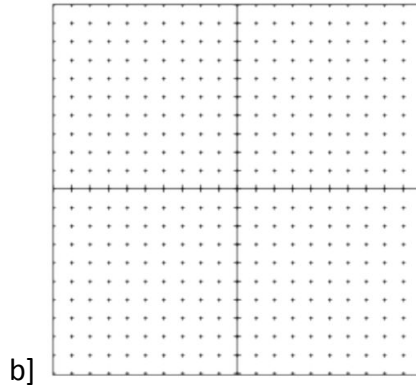
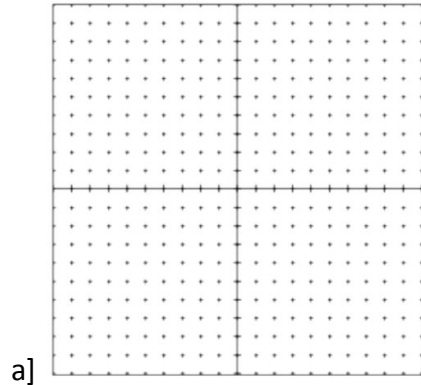
- a]  $2^5$       b]  $\ln \ln e^3$       c]  $8^3$       d]  $\sqrt[3]{9}$   
 e]  $2^{10}$       f]  $e^{\ln \ln 8}$       g]  $e^2$       h]  $9^3$   
 i]  $25 + 4$       j]  $40 - 5$       k]  $(\sqrt{2})^5$

23] Solve for x.

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

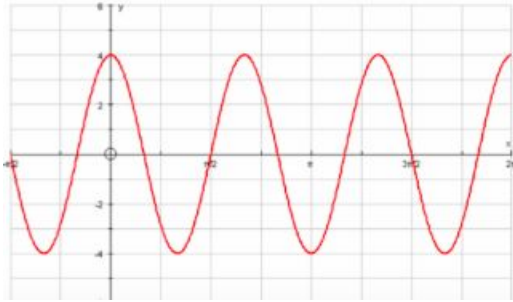
24] **CIRCLES AND ELLIPSES:** Graph.

- a]  $x^2 + y^2 = 16$       b]  $x^2 + y^2 = 5$       c]  $\frac{x^2}{1} + \frac{y^2}{9} = 1$       d]  $\frac{x^2}{16} + \frac{y^2}{4} = 1$

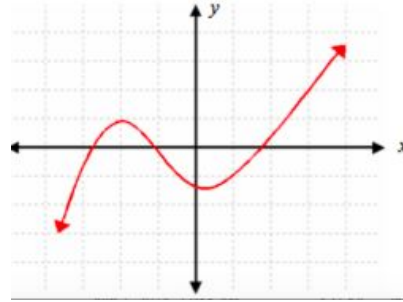


25] **EVEN AND ODD FUNCTIONS**

State whether the graphs are even, odd, or neither.



a)



b)

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

c]  $f(x) = 2x^4 - 5x^2$

d]  $g(x) = x^5 - 3x^3 + x$

e]  $h(x) = 2x^2 - 5x + 3$

f]  $j(x) = 2\cos(x)$

g]  $k(x) = \sin \sin(x) + 4$

h]  $l(x) = \cos \cos(x) - 3$

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

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

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

c]  $f(x) = \frac{2+x}{x^2(1-x)}$

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

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

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

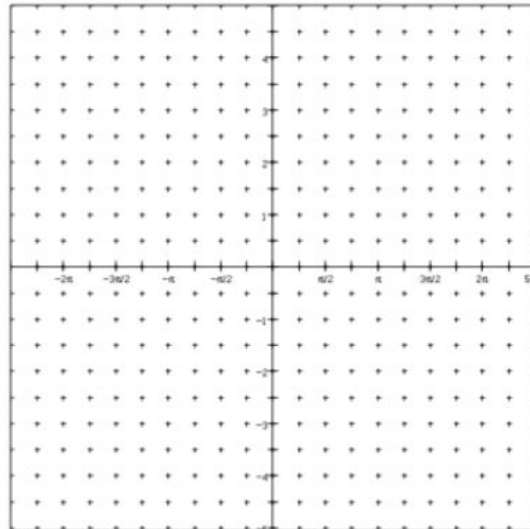
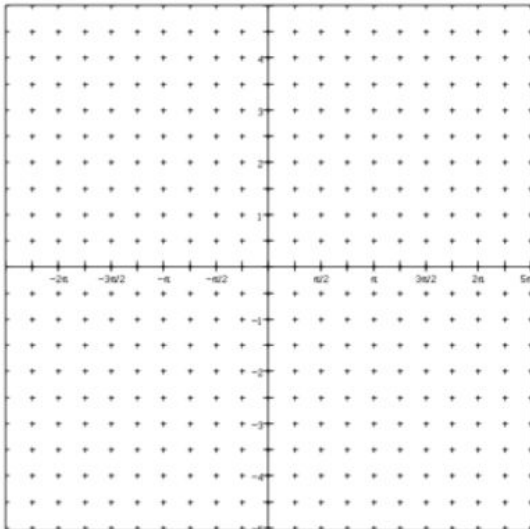
b]  $f(x) = \frac{5x^3-2x^2+8}{4x-3x^3+5}$

c]  $f(x) = \frac{(2x-5)^2}{x^2-x}$

28] **TRIGONOMETRIC FUNCTIONS:** Graph two complete periods of each function.

a]  $f(x) = 5\sin(x)$

b]  $f(x) = \sin(2x)$



c]  $f(x) = -\cos\left(x - \frac{\pi}{4}\right)$

d]  $f(x) = \cos(x) - 3$

