AP CALCULUS AB SUMMER PACK 2024

This packet will **not be graded**. The purpose of this packet is to make sure you understand and know all topics discussed below. If there is a topic you are not familiar with, or seem to struggle with, be sure to practice those questions and review notes/resources below to prepare.

TIPS:

1. Refer to your pre-calculus notebook, the internet, or the links provided below
2. Do not wait until the last minute to look over this packet. You don't want to find out you need to review something too late.
3. Be sure you are able to solve each problem step-by-step
4. Round decimal answers to 3 decimals maximum.
5. Answers will be posted in the classroom sometime in August.

Resources:

You may find some of the websites below useful. For certain information, you may want to print and keep a copy for your notebook. I will also provide a summary of trig identities at the start of the year.

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

TOPICS

1. <u>COMPLEX FRACTIONS</u>: Simplify each of the following

a. $\dfrac{\frac{25}{a}-a}{5+a}$

b. $\dfrac{4-\frac{12}{2x-3}}{5+\frac{15}{2x-3}}$

c. $\dfrac{\frac{x}{x+1}-\frac{1}{x}}{\frac{x}{x+!}+\frac{1}{x}}$

2. <u>SIMPLIFYING EXPRESSIONS</u>: Write answers with positive exponents only.

a. $\dfrac{\frac{2}{x^2}}{\frac{10}{x^3}}$

b. $\dfrac{12x^{-3}y^2}{18xy^{-1}}$

c. $(4a^{5/3})^{3/2}$

d. $x^{3/2}(x+x^{5/2}-x^2)$

e. $\dfrac{5-x}{x^2-25}$

3. Expand using <u>PASCAL'S TRIANGLE</u>: $(x - 2y)^5$

4. <u>FUNCTIONS:</u> Let $f(x) = x^2$, $g(x) = 2x + 5$, $h(x) = x^2 - 1$. Find each of the following

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

5. <u>INTERCEPTS:</u> For the x-intercepts and y-intercepts for the following

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

6. <u>POINTS OF INTERSECTIONS:</u> Find the POI(s) of the graphs algebraically

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

7. <u>INTERVAL NOTATION, SET-BUILDER NOTATION, INEQUALITIES, & GRAPHS</u>
Complete the table with the appropriate notation or graph.

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

8. <u>DOMAIN & RANGE</u>
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. $f(x) = 3sin(x)$ 　　　　d. $f(x) = \dfrac{2}{x-1}$

9. <u>INVERSE OF A FUNCTION</u>: Find the inverse of 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.

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

10. <u>EQUATIONS OF LINES</u>

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 ⅔

e. Find the equation of a line with an x-intercept of (2,0) and a y-intercept of (0,3)

11. <u>RADIAN & DEGREE MEASURES</u>

Convert to degrees.

a) $\frac{5\pi}{6}$ b) $\frac{4\pi}{5}$

Convert to radians.

a) 145°   b) -17°   c. 237°

12.<u>SPECIAL TRIANGLES & UNIT CIRCLE</u>
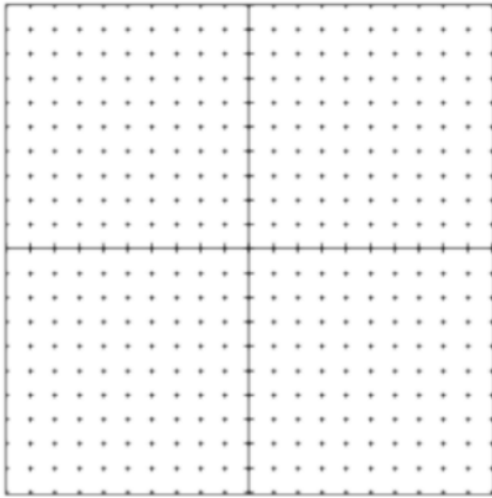
Use special triangles and CAST rule to determine the exact value of the following:

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] $\sin\left(-\frac{\pi}{6}\right)$

13.TRIGONOMETRIC EQUATIONS: Solve each of the equations for $0 \le x \le 2\pi$

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

14. PIECEWISE FUNCTION: Graph the function. Indicate the domain and range.

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

15. TRANSFORMATIONS

a) Given $f(x) = x^2$ and $g(x) = (x - 3)^2 + 1$. Describe the transformation from f to g

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) $(\frac{1}{9})^x = 27^{2x+4}$ c) $(\frac{1}{6})^x = 216$

18. LOGARITHMS: Evaluate.

a] $\log_7 7$ b] $\log_3 27$ c] $\log_2 (\frac{1}{32})$ d] $\log_{25} 5$

e] $\log_9 1$ f] $\log_4 8$ g] $\ln \sqrt{e}$ h] $\ln (\frac{1}{e})$

19. PROPERTIES OF LOGARITHMS:

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. SOLVING LOGARITHMIC EQUATIONS:

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] $\ln(x+5) = \ln(x-1) - \ln(x+1)$

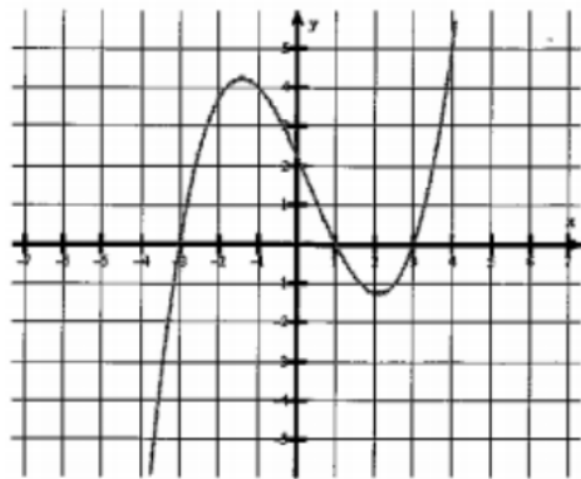21. VERTICAL ASYMPTOTES: Determine all vertical asymptotes

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

22. HORIZONTAL ASYMPTOTES: Determine all horizontal asymptotes

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

23. GRAPHICAL ANALYSIS

a) State the domain of f

b) Date 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?

24. PARENT FUNCTIONS: Know the characteristics of parent functions studied in ALG I, ALG II, and Pre-Calc.

Linear	*Quadratic*	*Cubic*	*Quartic*	*Absolute Value*	*Square Root*	*Quintic*
Cubed Root	*Exponential*	*Logarithmic*	*Rational*	*Reciprocal*	*Inverse*	*Constant*
Piecewise	*Sine*	*Cosine*	*Tangent*	*Secant*	*Cosecant*	*Cotangent*