

Name: \_\_\_\_\_

AP Calculus AB Summer Packet

**Hello! Welcome to AP Calculus. I am looking forward to meeting you all this fall. Since this is an AP class, there is information that I expect you to know walking in the door next fall. The following packet is comprised of questions that you are expected to know how to do. If you are struggling with some concepts, there are plenty of resources on the internet that you can use. Some of the questions in this packet will be marked non-calculator. Obviously there is no way for me to know whether or not you use one while you complete this packet, but just know in class and on exams you will be expected to know how to do the question without it. There will be a test on this material within the first week of school, so make sure you complete this packet to the best of your ability. The packet will also be collected on the day of the exam**

**Directions:** Please complete the following problems. You must show ALL work.

Simplify.

1.  $\frac{x^3 - 9x}{x^2 - 7x + 12}$

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

3.  $\frac{\frac{1}{x} - \frac{1}{5}}{\frac{1}{x^2} - \frac{1}{25}}$

4.  $\frac{\sqrt{x-2} + \frac{5}{\sqrt{x-2}}}{x-2}$

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

Use your log rules to expand or simplify the following expressions.

6.  $\log_3 5x^2$

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

8.  $\log_2 5 + \log_2 (x^2 - 1) - \log_2 (x - 1)$

Use what you know about the unit circle to evaluate the following. Your answers should be left in simplest radical form. These are all values you should know off the top of your head!

9.  $\sin(30^\circ) = \underline{\hspace{2cm}}$

10.  $\cos\frac{2\pi}{3} = \underline{\hspace{2cm}}$

11.  $\tan(45^\circ) = \underline{\hspace{2cm}}$

12.  $\sin\left(-\frac{\pi}{6}\right) = \underline{\hspace{2cm}}$

13.  $\tan(\pi) = \underline{\hspace{2cm}}$

14.  $\csc\left(\frac{5\pi}{6}\right) = \underline{\hspace{2cm}}$

15.  $\cos\left(\frac{\pi}{2}\right) = \underline{\hspace{2cm}}$

16.  $\cos\left(\frac{3\pi}{4}\right) = \underline{\hspace{2cm}}$

17.  $\tan\left(\frac{\pi}{6}\right) = \underline{\hspace{2cm}}$

18.  $\cos^{-1}\left(\frac{1}{2}\right) = \underline{\hspace{2cm}}$

19.  $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \underline{\hspace{2cm}}$

20.  $\tan^{-1}(1) = \underline{\hspace{2cm}}$

Verify the following identities.

21.  $\frac{\cos x \sec x}{\tan x} = \cot x$

22.  $(\sin x + \cos x)^2 = 1 + 2\sin x \cos x$

Find an equation of the line:

23. Through (6,-2) with a slope of 4

24. x-intercept= 4 and y-intercept= -1

25 Through (4, 0) and perpendicular to  $3x + 5y = 9$ .

26. Given  $f(x) = x^2 - 2x + 1$  and  $g(x) = 4 + \sqrt{x}$ , find

a.  $5f(-3)$

b.  $\frac{f(x)-f(1)}{x-1}$ .

c.  $g(f(2))$

d.  $g^{-1}(x)$

27. Given  $f(x) = \frac{1}{x}$ , find  $\frac{f(x+\Delta x)-f(x)}{\Delta x}$ .

Find ALL points of intersection:

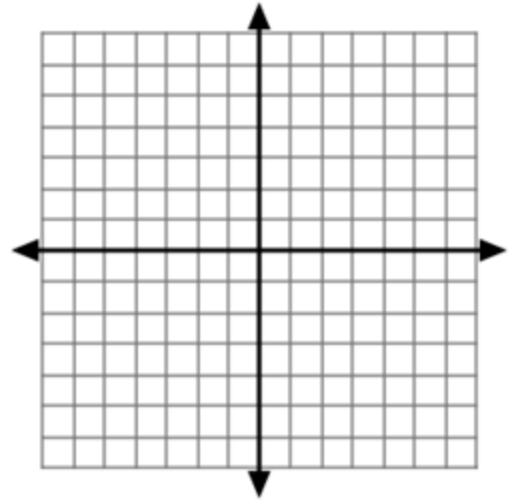
28.  $3x - 2y = -4$   
 $4x + 2y = -10$

29.  $x = 3 - y^2$   
 $y = x - 1$

30. Given:  $y = \frac{2x^2 + 2x - 12}{x^2 - 9}$

Identify:

- a. any holes \_\_\_\_\_
- b. any vertical asymptotes \_\_\_\_\_
- c. any horizontal asymptotes \_\_\_\_\_
- d.  $x$  - intercepts \_\_\_\_\_
- e.  $y$  - intercepts \_\_\_\_\_
- f. Graph.



For the following functions sketch a graph and identify the domain and range for each.

31.  $f(x) = x$

32.  $f(x) = x^2$

33.  $f(x) = x^3$

34.  $f(x) = |x|$

35.  $f(x) = \frac{1}{x}$

36.  $f(x) = \sqrt{x}$

37.  $f(x) = e^x$

38.  $f(x) = \ln x$

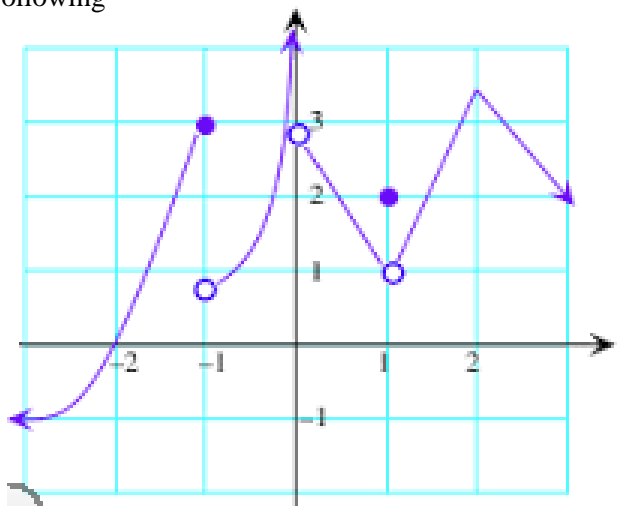
39.  $f(x) = \sqrt{9 - x^2}$

40.  $f(x) = \sin x$

41.  $f(x) = \cos x$

42.  $f(x) = \tan x$

Use the graph to evaluate the following



43.  $\lim_{x \rightarrow -1} f(x)$

44.  $\lim_{x \rightarrow 1} f(x)$

45.  $\lim_{x \rightarrow 2} f(x)$

46.  $\lim_{x \rightarrow 0} f(x)$

47.  $\lim_{x \rightarrow \infty} f(x)$

48.  $f(1)$

Evaluate the following limits:

49.  $\lim_{x \rightarrow 3} \frac{x^2 - 4x + 3}{x - 3}$

50.  $\lim_{x \rightarrow 0} 3 \cos 2x + 2$

51.  $\lim_{x \rightarrow h} \frac{(x+h)^2 - x^2}{h}$