

## AP Calculus AB Summer Assignment

Dear AP Calculus AB Student,

You are currently registered for Advanced Placement Calculus AB next fall and I look forward to working with you. Students have been successful in the past because of their dedication and effort.

To aid in the your success, a packet has been created containing several exercises of prerequisite skills. During the summer break, please work the problems and write your final responses in the answer blanks provided. At some point between now and the start of school this fall, you are expected to **complete all exercises on the following pages. This packet is due the first day of school.** The content contained in this packet is *pre-requisite* knowledge for AP Calculus AB, and may be tested on the first exam. A list of learning targets you will be accountable for from this summer assignment are below.

It is quite possible that some of the exercises in the packet will have 'escaped' you. There are many resources available to help in reviewing such forgotten concepts – the Internet, review software and books available at most media stores, libraries, etc.

Thank you in advance for your time this summer to make next year easier and more productive for all involved. We should have a great year, and I am enthusiastic to begin working with all of you.

Have a great summer!

*Dr. Browdy*

### Learning Targets

#### I CAN...

1. Find the slope of a line
2. Find the midpoint of two points
3. Find the equation of a line
4. Find the distance between two points
5. Perform composition of functions
6. Find the inverse of a function
7. Prove to functions are inverses algebraically
8. Factor expressions
9. Identify roots, intercepts, and points of discontinuity for rational functions
10. Simplify trigonometric expressions using trig IDs
11. Simplify logarithmic expressions using properties of logs
12. Simplify rational expressions
13. Simplify polynomial expressions
14. Solve polynomial equations
15. Solve trigonometric equations
16. Solve logarithmic equations
17. Solve exponential equations
18. Evaluate the exact value of a trig function for any angle on the unit circle
19. Give the domain, range, and graph for any of the 12 basic functions

These exercises are expected to be completed and are due the first day of class. Any rounding should be done to four decimal place accuracy. Answer in the blanks provided.

**Points and Lines**

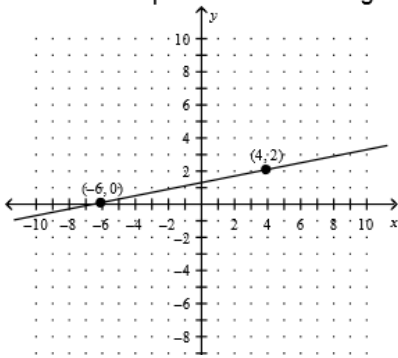
*In this section, you will practice writing equations and finding distance.*

*HINT: You may want to reference point-slope form, slope-intercept form, midpoint formula, and the distance formula.*

1. Find the equation of the line through (1, 2) and (-1, 4). 1. \_\_\_\_\_

2. Find the equation of the line that passes through (2, -1) and is perpendicular to the line  $2x - 3y = 5$ . 2. \_\_\_\_\_

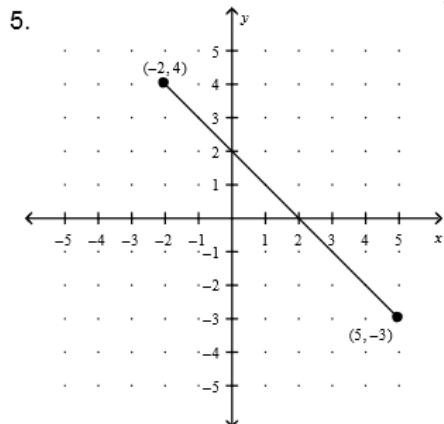
3. Find the equation for the line given in the graph. 3. \_\_\_\_\_



↓

4. Find the equation of the line that is the perpendicular bisector of the line between points (-7, 2) and (4, -1). 4. \_\_\_\_\_

Find the distance of the line connecting the given points. 5. \_\_\_\_\_



6. (15, 6) and (-7, 2) 6. \_\_\_\_\_

Relationships between Functions

*In this section, you will review composition of functions as well as inverse functions.*

Given that  $f(x) = \frac{x}{x-1}$ ,  $g(x) = 2x + 3$ , and  $h(x) = f^{-1}(x)$ , find:

7.  $f(g(x))$                       8.  $(g \circ f)(x)$                       9.  $h(x)$

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. Prove that  $f(x)$  and  $h(x)$  are inverses algebraically.

10. show work to left

Factoring

*Everyone's favorite...factoring. This section will test your skills factoring two and three term expressions.*

Factor completely.

11.  $3x^3 + 192$

12.  $x^2 - b$

11. \_\_\_\_\_

12. \_\_\_\_\_

13.  $9x^2 - 3x - 2$

14.  $2x^{\frac{5}{4}} + x^{\frac{3}{4}} - 15x^{\frac{1}{4}}$

13. \_\_\_\_\_

14. \_\_\_\_\_

**Rational Functions**

In this section, you will review properties of rational functions, including: roots, intercepts, and asymptotes.

Identify any points of discontinuity on the graphs, including infinite discontinuity (asymptotes) and removable discontinuity (holes). Give the equation for any asymptotes and the point for any holes.

15.  $y = \frac{2x}{x-4}$

16.  $y = \frac{x^2 - 2x + 1}{x^2 + x - 2}$

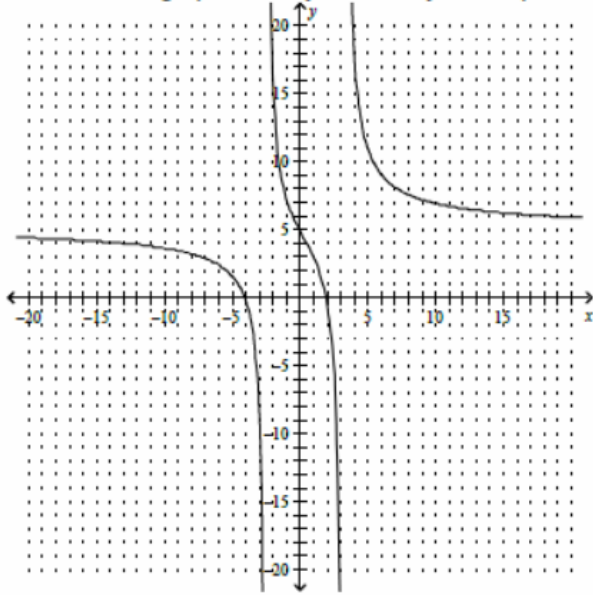
15. asymptotes:

holes:

16. asymptotes:

holes:

17. Given the graph, identify all roots, y-intercepts, and asymptotes.



17. roots:

y-intercepts:

asymptotes:

**Simplifying Expressions**

Here you will find a selection of various types of expressions you have simplified in the past – rational, logarithmic, polynomials, and trigonometric.

Simplify.

18.  $1 - \sec^2 x$

19.  $2 \ln(x - 3) + \ln(x + 2) - 6 \ln x$

18. \_\_\_\_\_

19. \_\_\_\_\_

$$20. \frac{\frac{2}{x}-3}{1-\frac{1}{x-1}}$$

$$21. \cos^2 x + \sin^2 x$$

20. \_\_\_\_\_

21. \_\_\_\_\_

22. \_\_\_\_\_

$$22. 2 \ln x^3 - \frac{1}{2} \ln 9$$

$$23. \frac{1 + \cos 2x}{2}$$

23. \_\_\_\_\_

24. \_\_\_\_\_

$$24. \cos^2 x - \sin^2 x$$

$$25. 5(x+2)^2 - x(x+2)$$

25. \_\_\_\_\_

### Solving Equations

Here you will find a selection of various types of equations you have solved in the past – rational, logarithmic, exponential, polynomials, and trigonometric.

Solve algebraically. You may wish to check your answers graphically. Watch out for extraneous solutions.

$$26. 4t^3 - 12t^2 + 8t = 0$$

$$27. 3\sqrt{x-2} - 8 = 8$$

26. \_\_\_\_\_

27. \_\_\_\_\_

28.  $2 \sin x = \csc x, 0 \leq x < 2\pi$

29.  $2 \ln x = 14$

28. \_\_\_\_\_

29. \_\_\_\_\_

30.  $4e^{2x} = 5$

31.  $(x-4) - 5(x-4)^{\frac{1}{2}} = 6$

30. \_\_\_\_\_

31. \_\_\_\_\_

32.  $2 \sin^2 x = \sin x + 1; x[0, 2\pi)$

33.  $4^x = 11$

32. \_\_\_\_\_

33. \_\_\_\_\_

34.  $\frac{10}{x} + 3 = \frac{x+9}{x-4}$

35.  $3 \log_8(2x+7) + 8 = 10$

34. \_\_\_\_\_

35. \_\_\_\_\_

36.  $\ln(x+3) + \ln(x) = 1$

36. \_\_\_\_\_

The remaining sections of this packet should be done with **NO CALCULATOR.**

Unit Circle/Trig

In this section, you will find some practice recalling angles from the unit circle and their trig values, as well as inverse trig functions.

Find the exact value.

37.  $\sin\left(\frac{7\pi}{6}\right)$

38.  $\cos\left(\frac{\pi}{2}\right)$

39.  $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

37. \_\_\_\_\_

38. \_\_\_\_\_

39. \_\_\_\_\_

40. \_\_\_\_\_

40.  $\tan \pi$

41.  $\cos^{-1}\left(\sin\left(\frac{11\pi}{6}\right)\right)$

42.  $\tan^{-1}(-1)$

41. \_\_\_\_\_

42. \_\_\_\_\_

Basic Functions

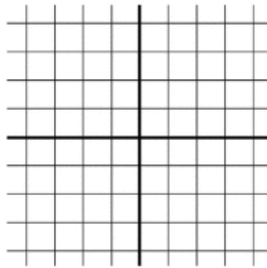
You did 12 basic functions in pre-calc, here you should be able to recall them by memory.

For each function below, sketch an accurate graph, identify any important points (label intercepts, give dashed lines for asymptotes), and then state the domain and range.

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

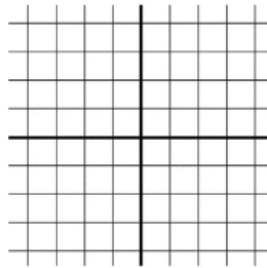
44.  $f(x) = \sin x$

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



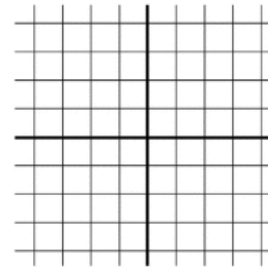
Domain: \_\_\_\_\_

Range: \_\_\_\_\_



Domain: \_\_\_\_\_

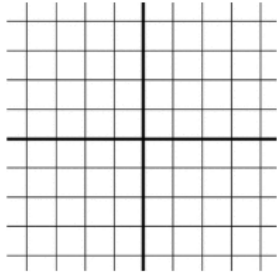
Range: \_\_\_\_\_



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

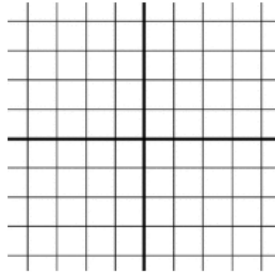
46.  $f(x) = \sqrt{x}$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

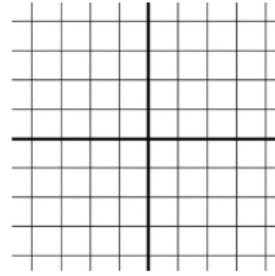
47.  $f(x) = \cos x$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

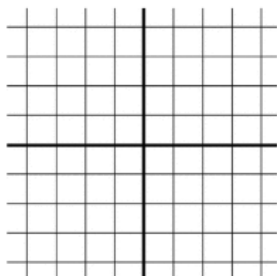
48.  $f(x) = x$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

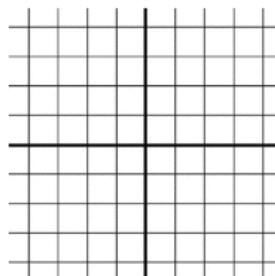
49.  $f(x) = x^2$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

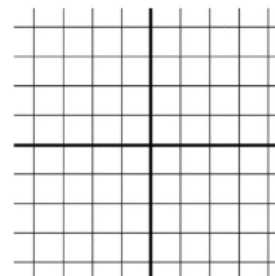
50.  $f(x) = \ln x$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

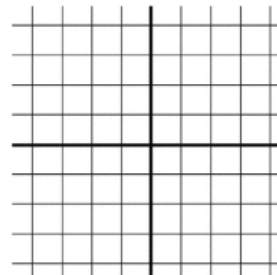
51.  $f(x) = \frac{1}{x^2}$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

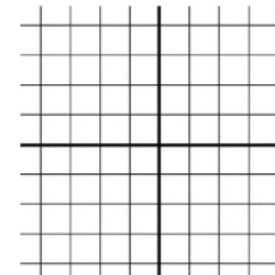
52.  $f(x) = e^x$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

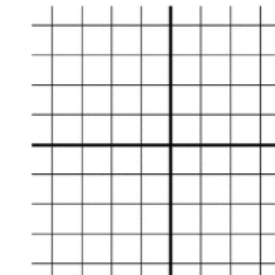
53.  $f(x) = |x|$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

54.  $f(x) = \text{int}(x)$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_