

**Summer Assignment for AP Calculus AB/BC**

Solve the following problems. Show all work and attach to answer sheet. This will be graded.

Solve:

1.  $|x+4| > 3$  \_\_\_\_\_

2. Decide whether **Line 1** and **Line 2** are parallel, perpendicular, or neither.

**Line 1** passes through (3, 8) and (6, 13)

**Line 2** passes through (-2, 9) and (-7, 12) \_\_\_\_\_

3. Find the slope of the line passing through (3, -1) and (6, 4). \_\_\_\_\_

4. Which line is steeper,  $y = \frac{5}{3}x - 2$  or  $y = \frac{3}{2}x + 3$ ? \_\_\_\_\_

5. Write the equation of the line, in slope-intercept form, that passes through the point (6, 3) and has slope -5. \_\_\_\_\_

6. Write the equation of the line, in point-slope form, that passes through the point (-3,-7) and is perpendicular to the line  $y = 2x - 5$ . \_\_\_\_\_

7. Write the equation of the line, in point-slope form, that passes through the point (1,2) and that is parallel to  $2x + 3y = 10$ . \_\_\_\_\_

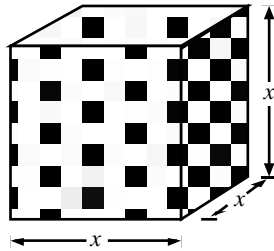
8. Evaluate  $f(-3)$ .  $f(x) = \begin{cases} -x^2 + 2x, & x \leq 1 \\ -2x + 3, & x > 1 \end{cases}$  \_\_\_\_\_

9. Write  $f(x) = |x-4|$  as a piecewise function. \_\_\_\_\_

10. Graph the function  $y = 2(x - 3)(x - 3)$ . Label the vertex, axis of symmetry, and  $x$ -intercepts.



11. The surface area of a cube is 536 square inches. How long is each edge? (Round to two decimal places.)



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12. The height of a triangle is three feet longer than the base. The area of the triangle is 35 square feet. Find the height and base of the triangle.

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Simplify:

13.  $\frac{4x^3}{y^2} \cdot \frac{y^{-3}x^{-2}}{8x^{-1}}$

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Simplify:

14.  $(-3x^{-2})^{-3}$

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15. Solve for  $x$ .  $2^3 \cdot 4^x \cdot 8^2 = 16^3$

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16. State the left and right behaviors of the graph of  $f(x) = -x^3 + 7x + 4$ .

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Solve:

17.  $x^3 - 8x^2 = 0$

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18. You are given a piece of cardboard 10 inches long and 6 inches wide. You want to create an open topped box by cutting  $x$ -inch squares out of the corners and folding up the sides so the edges you just cut form right angles. What is the maximum volume of the box (rounded to the nearest tenth of a cubic inch)? What are the approximate dimensions of the box (rounded to the nearest quarter-inch)? (Remember:  $0 < x < 3$ )

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19. Evaluate:  $27^{2/3}$

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20. Evaluate.  $16^{-5/4}$

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21. Rewrite  $18^{1/6}$  using radical notation.

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22. The volume of a sphere can be given by the formula  $V = 4.18879r^3$ . You have to design a spherical container that will hold a volume of 60 cubic inches. What should the radius of your container be?

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23. Let  $f(x) = 16 - x^2$  and  $g(x) = 4 - x$ . Find  $\frac{f(x)}{g(x)}$ .

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24. A large city is growing by a rate of 0.5% annually. If there were 1,770,000 residents of the city in 1992, predict how many (to the nearest thousand) will be living in the city in 2000. Use  $y = 1,770,000(2.7)^{0.005t}$ , where  $t = 0$  represents 1992.

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25. Find the inverse of the relation  $f = \{(-9, -1), (-1, -9), (-6, -4)\}$

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26. Are  $f$  and  $g$  inverses of each other?

$$f(x) = \frac{2}{3}x - \frac{1}{2}, \quad g(x) = \frac{3}{2}x - \frac{3}{4}$$

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27. Refer to the function  $g(x) = 2 + \sqrt{x+1}$ . What is the domain and range of  $g(x)$ ?

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28. If there are initially 2500 bacteria in a culture, and the number of bacteria double each hour, the number of bacteria after  $t$  hours can be found using the formula  $N = 2500(2^t)$ . How many bacteria will be present after 7 hours?

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29. Simplify the expression.  $e^x \cdot 6e^{3x-1}$

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30. Write the equation  $\log_{125} 25 = \frac{2}{3}$  in exponential form.

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31. Find the inverse of the function.  $y = \log_8 x$

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32. Expand using the properties of logarithms:  $\log_5 \frac{x(x+3)}{x^6}$

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Simplify:

33. 
$$\frac{\frac{2}{x} - \frac{3}{3x}}{\frac{1}{3x} + \frac{3}{2x}}$$

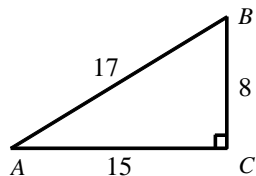
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Simplify:

34. 
$$\frac{\frac{x^2 - 16x + 64}{10x}}{\frac{x - 8}{5x}}$$

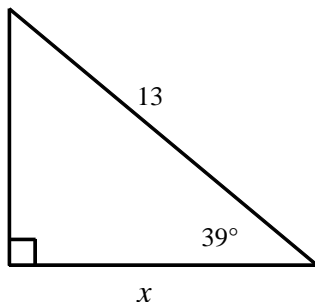
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35. Write  $\sin B$  as a fraction in lowest terms.



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36. Find  $x$  to the nearest hundredth.



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Evaluate without using a calculator. Exact value only.

37.  $\sin \frac{\pi}{6}$

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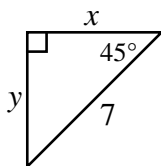
38.  $\cot \frac{\pi}{4}$

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39.  $\cos \left( -\frac{\pi}{3} \right)$

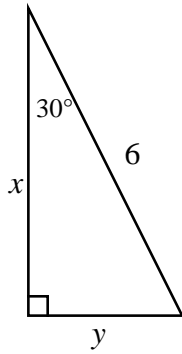
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40. Find the missing side lengths for  $x$  and  $y$ .



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41. Find the missing side lengths for  $x$  and  $y$ .



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42. Find the exact value, in radians, without using a calculator, of  $\sin^{-1}\left(-\frac{1}{2}\right)$ .

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43. Given triangle  $ABC$  with  $a = 4$ ,  $A = 46^\circ$ , and  $B = 31^\circ$ , find  $c$ . Round your answer to two decimal places.

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44. Find the *amplitude* and *period* of the graph of  $f(x) = 3\sin(2\pi x)$ .

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45. Simplify the expression. Do not evaluate it.  
 $\sin 30^\circ \cos 40^\circ + \cos 30^\circ \sin 40^\circ$

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46. Evaluate and simplify the difference quotient for  $f(x) = 2x^2$

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47. Find the derivative of  $h(x) = -x + x^2$

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