

AP Calculus Summer Assignment Freehold Township High School



Welcome to AP Calculus! The assignment has been created as a means of reviewing important skills and concepts that you have learned. The assignment will give you insight as to what you need to know fluently to be successful in AP Calculus. These are skills that you have covered previously and must be proficient in as we progress through the year. **If you need help with a topic/question, you can use a QR code reader on your mobile device to scan the code to the right of the question or click on the code if viewing digitally.** Each graph should have actual plotted points. The assignment is due on the first day of class and will be graded. There will be a 10% deduction for late assignments and work must be shown, when necessary, for credit.

You should complete all questions except #1-57 without using any calculator. Questions #58-60 require the use of a graphing calculator. We will use the Texas Instruments TI-84 Plus or CE calculator in class. Although you are not required to purchase your own graphing calculator, it is highly advantageous to have your own. There will be a set of graphing calculators in class, but they must always remain in the classroom. You can download an emulator here: <https://education.ti.com/en/software/update/free-ti-software-license-student>.

Try not to put this assignment off until the end of the summer. Work in short segments throughout the summer so that it will not be a burden on you. Take this assignment seriously and do the work on your own to see if you are prepared to take a college level math course. Make sure you know the material. We look forward to seeing all of you next year and have a wonderful summer!

I. Write an equation of the line with the given characteristics.

1.) A line that goes through the point (1, -6) and has a slope of 3.



2.) A vertical line through the point (0, -3).

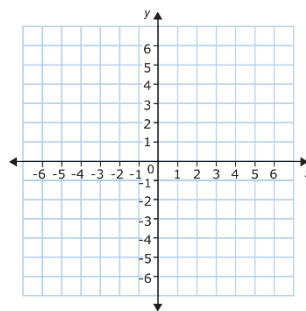
3.) A line that goes through the point (3, 1) and is parallel to the line represented by $2x - y = -2$.

4.) A line that goes through the point (3, 1) and is perpendicular to the line represented by $2x - y = -2$.

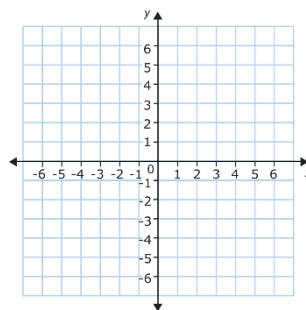
5.) A line with an x-intercept at (3, 0) and a y-intercept at (0, -5)

II. For each of the following equations, find the domain, range, and graph the function.

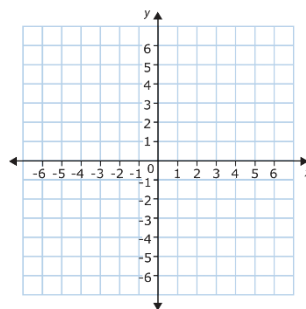
6.) $\frac{2}{3}x - y = 3$



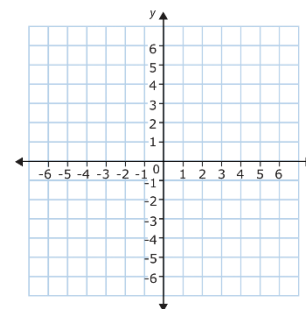
7.) $y = \sqrt{1-x} - 2$



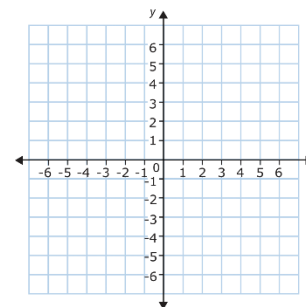
8.) $y = 2e^{-x} - 3$



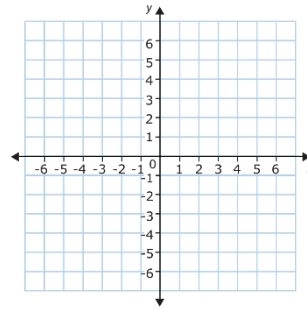
9.) $y = \ln(x-3) + 1$



10.) $y = -|2x - 2| + 1$



$$11.) f(x) = \begin{cases} -x - 2, & \text{if } -2 \leq x \leq -1 \\ x, & \text{if } -1 < x < 1 \\ -x + 2, & \text{if } 1 < x \leq 2 \end{cases}$$



III. Evaluate the function.

$$12.) g(x) = \sqrt{5 - x}; g(-3) \text{ and } g^2(3)$$

$$13.) s(t) = t^2 - t + 2; s(t + 1)$$

$$14.) f(x) = \begin{cases} -x - 2, & \text{if } -2 \leq x \leq -1 \\ x, & \text{if } -1 < x < 1 \\ -x + 2, & \text{if } 1 < x \leq 2 \end{cases}; f(-1) \text{ and } f(1)$$



$$15.) h(x) = \begin{cases} \ln(x - 2) + 1, & \text{if } x < 0 \\ 5 \log_4 x + 3, & \text{if } x \geq 0 \end{cases}; h(64) \text{ and } h(0)$$

IV. Find $f(g(x))$ and $g(f(x))$.

$$16.) f(x) = 2 - x^2, g(x) = \sqrt{x + 2}$$



V. Find f^{-1}

$$17.) f(x) = \frac{2x+1}{x+3}$$



VI. Find the six trigonometric values of θ . Give exact values (no decimals).

$$18.) \theta = \cos^{-1}\left(\frac{3}{7}\right)$$



VII. Evaluate the trigonometric function ***without*** a calculator. Give exact values (no decimals).

$$19.) \sin \pi$$

$$20.) \cos \frac{3\pi}{2}$$

$$21.) \sin\left(-\frac{\pi}{2}\right)$$

$$22.) \cos \frac{5\pi}{4}$$



$$23.) \cos \frac{7\pi}{6}$$

$$24.) \cos(-\pi)$$

$$25.) \cos \frac{2\pi}{3}$$

$$26.) \sin\left(-\frac{\pi}{4}\right)$$

$$27.) \tan \pi$$

$$28.) \cot \frac{3\pi}{2}$$

$$29.) \sin^{-1} \frac{\sqrt{3}}{2}$$

$$30.) \arctan 0$$

$$31.) \csc \frac{3\pi}{4}$$

$$32.) \cos^{-1}\left(-\frac{1}{2}\right)$$

$$33.) \sec\left(-\frac{\pi}{2}\right)$$

$$34.) \csc \frac{\pi}{6}$$

VIII. Solve the equation over the interval $0 \leq x < 2\pi$. Give exact values (no decimals).

35.) $\sin(x) = \frac{\sqrt{3}}{2}$



36.) $6 \cos(x) + 1 = 3\sqrt{2} + 1$

37.) $-5 \tan(x) + 2 = -3$

IX. Find all of the horizontal and vertical asymptotes and holes for the function.

38.) $f(x) = \frac{2x^2 - 6x - 8}{x^2 + 7x + 6}$



39.) $f(x) = \frac{5}{x^2 - 4}$



40.) $f(x) = \frac{x^5}{x+2}$

X. Simplify the expression.

$$41.) \frac{\frac{2+3}{x+y}}{\frac{-5+7}{x+y}}$$



XI. Evaluate the logarithmic expressions **without** a calculator.

$$42.) \log_3 81$$

$$43.) \log_{25} 5$$



$$44.) \ln 1$$

$$45.) \ln \sqrt{e}$$

XII. Expand or condense the logarithmic expression.

$$46.) \text{Expand: } \log_5 \frac{125x^2}{y^3}$$



$$47.) \text{Condense: } 5 \ln 2 + \ln 5 - 2 \ln 4$$

XIII. Solve each equation. Leave your in exact form (no decimals).

$$48.) 4 - 3^x = 0$$

$$49.) 5 \log_4 x - \log_4 3 = 2$$

XIV. Write the expression using only a natural logarithm. No decimals.

50.) $\log_7 14$



XV. Prove the identity. Show every step.

51.) $\frac{\sin x - 1}{1 - \frac{1}{\sin x}} = \sin x$



52.) $\frac{\cos^2 x}{1 - \cos^2 x} = \cot^2 x$

XVI. Solve the equation.

53.) $x^2 - 2x - 35 = 0$



54.) $6x^2 - 11x - 7 = 3$

55.) $0 = x^3 - 9x$

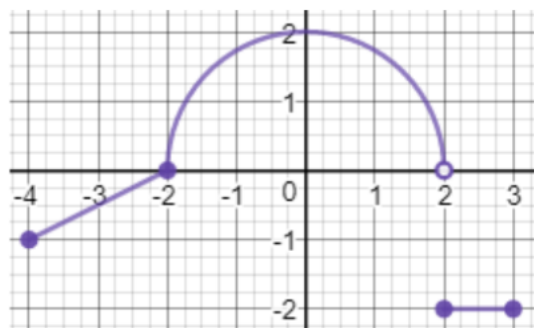
56.) $|1 - x| = 1 - x$



XVII. Write the equation of the piece-wise function shown in the graph.



57.)



XIII. Use a graphing calculator to solve the following problems. Round to three decimal places, when necessary.

58.) Find the point(s) of intersection for the pair of functions.

$$f(x) = 2x^2 + x - 9$$

$$g(x) = -\frac{3}{4}x + 3$$



59.) Find the x-intercepts and relative maximum and minimum values of each function.

a.) $y = x^3 - 4x^2 + 4x$

b.) $y = \cos^2 x - 3 \sin x$, for $[0, 2\pi)$



60.) Solve the following equations. Round to three decimal places.

a.) $3x^2 - x - 5 = 0$

b.) $2x^2 - 1 = 2^x$

