

# **CALCULUS**

## ***SUMMER REVIEW PACKET***

*DUE THE FIRST DAY OF SCHOOL*

The problems in this packet are designed to help you review topics that you should have already mastered and that are important to your success in calculus.

These problems should not just be attempted; they should be completed **CORRECTLY**. **DO NOT** use a calculator to solve these problems because you must know how to solve them without the aid of a calculator.

It is your responsibility to understand these concepts and be able to apply the necessary skills to solve problems like these.  
You will be held accountable for this material!

**Show all your work for each problem.**

You may want to work with one or more people on this, however each student must submit her or his own packet.

All work must be completed and ready to turn in on the first day of school.

Enjoy!

**I. Simplify. Show the work that leads to your answer.**

1.  $\frac{x-4}{x^2-3x-4}$

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

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

5.  $\frac{x^2-4x-32}{x^2-16}$

**II. Complete the following identities.**

1.  $\sin^2 x + \cos^2 x =$  \_\_\_\_\_

2.  $1 + \tan^2 x =$  \_\_\_\_\_

3.  $\cot^2 x + 1 =$  \_\_\_\_\_

4.  $\cos 2x =$  \_\_\_\_\_

5.  $\sin 2x =$  \_\_\_\_\_

**III. Simplify each expression in order to obtain a single fraction.**

1.  $\frac{1}{x+h} - \frac{1}{x}$

2.  $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$

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

4.  $\frac{2x}{x^2-6x+9} - \frac{1}{x+1} - \frac{8}{x^2-2x-3}$

**IV. Solve for z.**

1.  $4x + 10yz = 0$

2.  $y^2 + 3yz - 8z - 4x = 0$

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**V. Miscellaneous: Follow the directions for each problem.**

1. Evaluate  $\frac{f(x+h) - f(x)}{h}$  and simplify if  $f(x) = x^2 - 2x$ .

2. Expand  $(x + y)^3$ .

3. Simplify  $x^{\frac{3}{2}} \left( x + x^{\frac{5}{2}} - x^2 \right)$ .

4. Eliminate the parameter and write a rectangular equation for  $\begin{matrix} x = t^2 + 3 \\ y = 2t \end{matrix}$ .

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**VI. Expand and simplify.**

1.  $\sum_{n=0}^4 \frac{n^2}{2}$

2.  $\sum_{n=1}^3 \frac{1}{n^3}$

**VII. Simplify.**

1.  $\frac{\sqrt{x}}{x}$

2.  $e^{\ln 3}$

3.  $e^{(1+\ln x)}$

4.  $\ln 1$

5.  $\ln e^7$

6.  $\log_3(1/3)$

7.  $\log_{1/2} 8$

8.  $\ln \frac{1}{2}$

9.  $e^{3\ln x}$

10.  $\frac{4xy^{-2}}{12x^{-\frac{1}{3}}y^{-5}}$

11.  $27^{2/3}$

12.  $(5a^{2/3})(4a^{3/2})$

13.  $(4a^{5/3})^{3/2}$

14.  $\frac{3(n+1)!}{5n!}$

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**VIII. Using the point-slope form  $y - y_1 = m(x - x_1)$ , write an equation for the line:**

1. with slope  $-2$ , containing the point  $(3, 4)$ .
2. containing the points  $(1, -3)$  and  $(-5, 2)$ .
3. with slope  $0$ , containing the point  $(4, 2)$ .
4. perpendicular to the line in problem #1, containing the point  $(3, 4)$

**IX. Without a calculator, determine the exact value of each expression.**

1.  $\sin 0 =$  \_\_\_\_\_
2.  $\sin \frac{3\pi}{4} =$  \_\_\_\_\_
3.  $\cos \pi =$  \_\_\_\_\_
4.  $\cos \frac{3\pi}{4} =$  \_\_\_\_\_
5.  $\tan \frac{7\pi}{4} =$  \_\_\_\_\_
6.  $\tan \frac{2\pi}{3} =$  \_\_\_\_\_
7.  $\csc \frac{2\pi}{3} =$  \_\_\_\_\_
8.  $\sec \frac{3\pi}{2} =$  \_\_\_\_\_
9.  $\cot \frac{11\pi}{4} =$  \_\_\_\_\_
10.  $\cos\left(\sin^{-1} \frac{1}{2}\right) =$  \_\_\_\_\_
11.  $\sin^{-1}\left(\sin \frac{7\pi}{6}\right) =$  \_\_\_\_\_

**X. For each function, determine its domain and range.**

<i>Function</i>	<i>Domain</i>	<i>Range</i>
1. $y = \sqrt{x-4}$	_____	_____
2. $y = \sqrt{4-x^2}$	_____	_____
3. $y = \sqrt{x^2+4}$	_____	_____

**XI. Determine all points of intersection.**

1. The circle  $x^2 + y^2 = 25$  and the line  $4x - 3y = 0$ .
2. The curves  $y = \cos x$  and  $y = \sin x$  in the first quadrant.

**XII. Solve for  $x$ , where  $x$  is a real number. Show the work that leads to your solution.**

1.  $x^2 + 3x - 4 = 14$

2.  $\frac{x^4 - 1}{x^3} = 0$

3.  $(x - 5)^2 = 9$

4.  $2x^2 + 5x = 8$

5.  $(x + 3)(x - 3) > 0$

6.  $x^2 - 2x - 15 \leq 0$

7.  $12x^2 = 3x$

8.  $\sin 2x = \sin x, \quad 0 \leq x \leq 2\pi$

9.  $|x - 3| < 7$

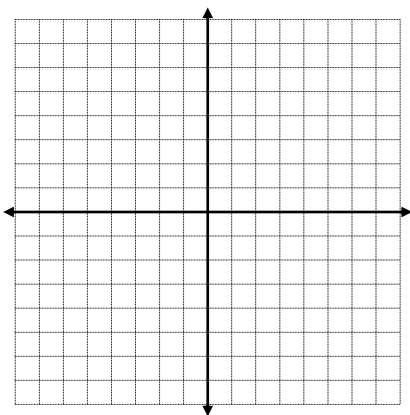
10.  $(x + 1)^2(x - 2) + (x + 1)(x - 2)^2 = 0$

11.  $27^{2x} = 9^{x-3}$

12.  $\log x + \log(x-3) = 1$

**XIII. Graph each function. Determine and label an appropriate scale. Give the domain and range for each function.**

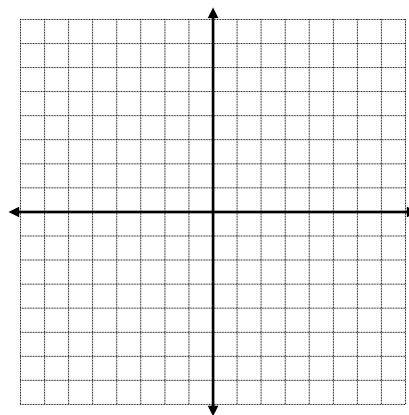
1.  $y = \sin x$



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

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

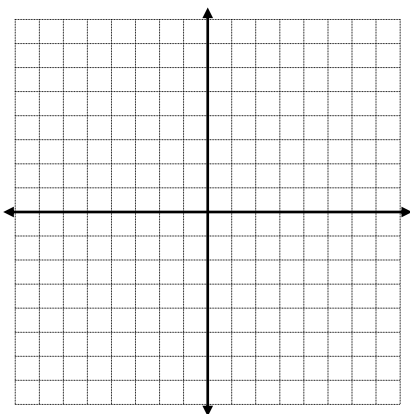
2.  $y = e^x$



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

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

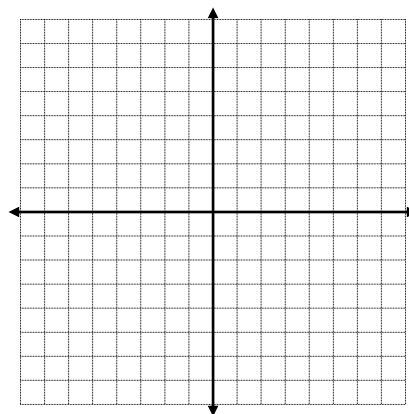
3.  $y = \sqrt{x}$



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

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

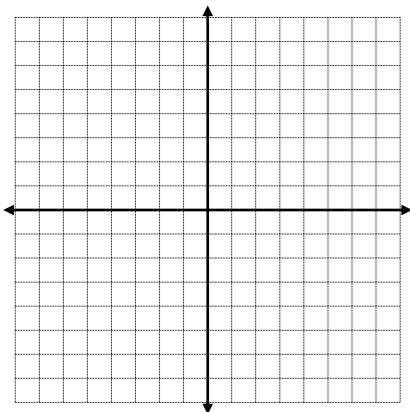
4.  $y = \sqrt[3]{x}$



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

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

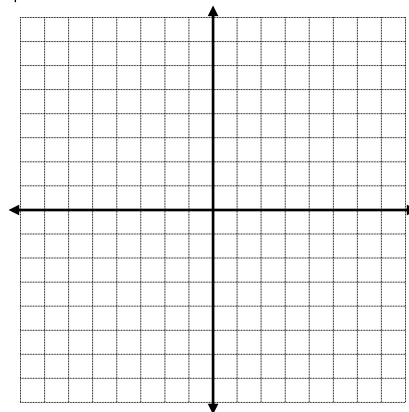
5.  $y = \ln x$



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

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

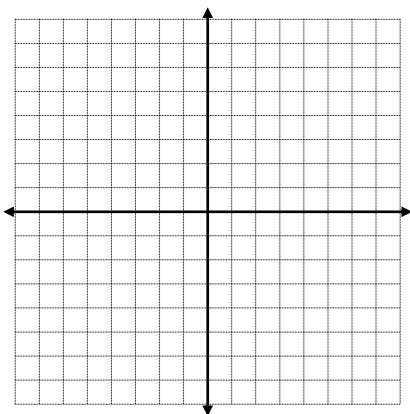
6.  $y = |x+3| - 2$



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

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

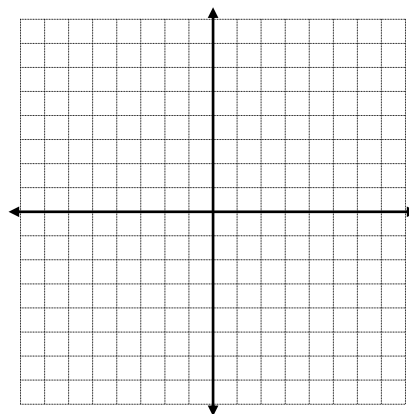
7.  $y = \frac{1}{x}$



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

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

8.  $y = \begin{cases} x^2 & \text{if } x < 0 \\ x+2 & \text{if } 0 \leq x \leq 3 \\ 4 & \text{if } x > 3 \end{cases}$



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

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