

*Calculus Summer Review Packet 2011*

**This will not be graded.**  
**It is for your benefit only.**

**DUE THE FIRST DAY OF SCHOOL**

The problems in this packet are designed to help you review topics that are important to your success in calculus. All work must be shown for each problem. The problems should be done correctly, not just tried. You are expected to get each problem correct. Please DO NOT use your calculators to solve these problems. You must know how to do all these problems WITHOUT a calculator.

**Note: Starred problems are for AP Calculus BC students only.**

It is recommended that you work with one or more people, but each person must submit his/her own packet. Before you leave school, write down the names, phone numbers, and/or email addresses for at least two people who are also taking calculus in the fall.

Name \_\_\_\_\_ Phone \_\_\_\_\_  
Email \_\_\_\_\_

Name \_\_\_\_\_ Phone \_\_\_\_\_  
Email \_\_\_\_\_

During the summer, answer keys will be posted on the Sherwood website.

*Enjoy your summer. We are looking forward to seeing you in the fall.*

***If you have any questions, please contact the math office at (301)924-3253!***

Simplify. Show the work that leads to your answer.

## Calculus Summer Review Packet

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

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

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

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

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II. Complete the following identities.

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

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

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

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

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

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III. Simplify each expression.

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

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## Calculus Summer Review Packet

IV. Solve for z:

1.  $4x + 10yz = 0$

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

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V. If  $f(x) = \{(3,5), (2,4), (1,7)\}$

$g(x) = \sqrt{x-3}$

$h(x) = \{(3,2), (4,3), (1,6)\}$

$k(x) = x^2 + 5$

determine each of the following:

1.  $(f + h)(1) =$  \_\_\_\_\_

2.  $(k - g)(5) =$  \_\_\_\_\_

3.  $(f \circ h)(3) =$  \_\_\_\_\_

4.  $(g \circ k)(7) =$  \_\_\_\_\_

5.  $f^{-1}(x) =$  \_\_\_\_\_

6.  $k^{-1}(x) =$  \_\_\_\_\_

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

8.  $(kg)(x) =$  \_\_\_\_\_

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VI. 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:  $x^{\frac{3}{2}}(x + x^{\frac{5}{2}} - x^2)$

\* 4. Eliminate the parameter and write a rectangular equation for  $x = t^2 + 3$   
 $y = 2t$

## Calculus Summer Review Packet

VII. Expand and simplify

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

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VIII. 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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## Calculus Summer Review Packet

IX. 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  $(3, 4)$       1. \_\_\_\_\_

2. containing the points  $(1, -3)$  and  $(-5, 2)$       2. \_\_\_\_\_

3. with slope  $0$ , containing the point  $(4, 2)$       3. \_\_\_\_\_

4. perpendicular to the line in problem #1, containing the point  $(3, 4)$       4. \_\_\_\_\_

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\* X. Given the vectors  $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$  and  $\mathbf{w} = 3\mathbf{i} + 4\mathbf{j}$ , determine

1.  $\frac{1}{2}\mathbf{v}$                       2.  $\mathbf{w} - \mathbf{v}$                       3. length of  $\mathbf{w}$                       4. the unit vector for  $\mathbf{v}$

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

1.  $\sin 0$  \_\_\_\_\_      2.  $\sin \frac{\pi}{2}$  \_\_\_\_\_      3.  $\sin \frac{3\pi}{4}$  \_\_\_\_\_

4.  $\cos \pi$  \_\_\_\_\_      5.  $\cos \frac{3\pi}{4}$  \_\_\_\_\_      6.  $\cos \frac{\pi}{3}$  \_\_\_\_\_

7.  $\tan \frac{7\pi}{4}$  \_\_\_\_\_      8.  $\tan \frac{\pi}{6}$  \_\_\_\_\_      9.  $\tan \frac{2\pi}{3}$  \_\_\_\_\_

10.  $\cos(\sin^{-1} \frac{1}{2})$  \_\_\_\_\_      11.  $\sin^{-1}(\sin \frac{7\pi}{6})$  \_\_\_\_\_

## Calculus Summer Review Packet

XII. For each function, determine its domain and range.

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

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XIII. Determine all points of intersection.

- |  |   |
|--|---|
| 1. parabola $y = x^2 + 3x - 4$ and<br>line $y = 5x + 11$ | 2. $y = \cos x$ and $y = \sin x$ in the<br>first quadrant |
|--|---|
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XIV. 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. $2x^2 + 5x = 8$           |
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## Calculus Summer Review Packet

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

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

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

7.  $12x^2 = 3x$

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

\* 9.  $|x - 3| < 7$

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

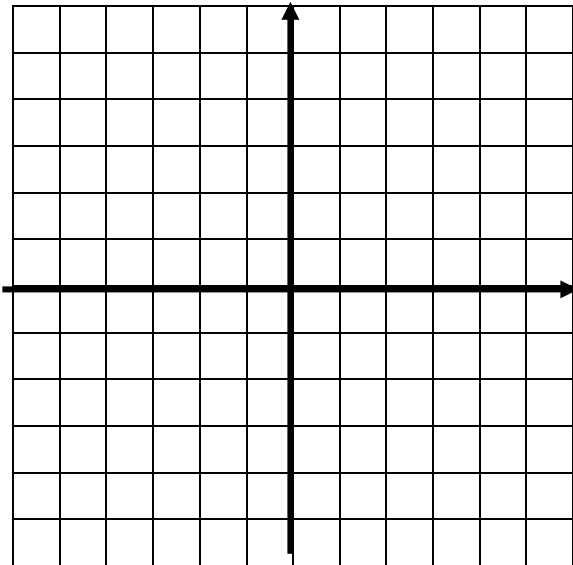
11.  $27^{2x} = 9^{x-3}$

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

## Calculus Summer Review Packet

XV. Graph each function. Give its domain and range.

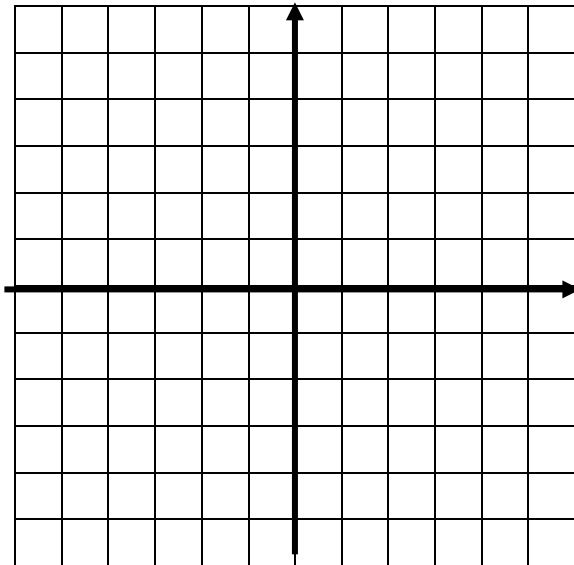
1.  $y = \sin x$



Domain \_\_\_\_\_

Range \_\_\_\_\_

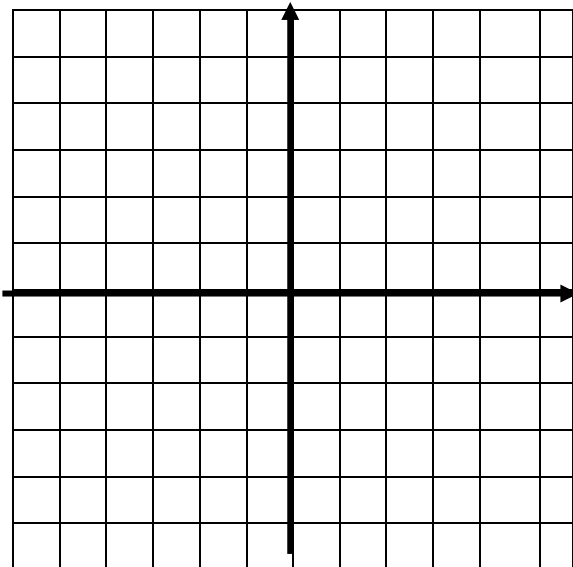
2.  $y = e^x$



Domain \_\_\_\_\_

Range \_\_\_\_\_

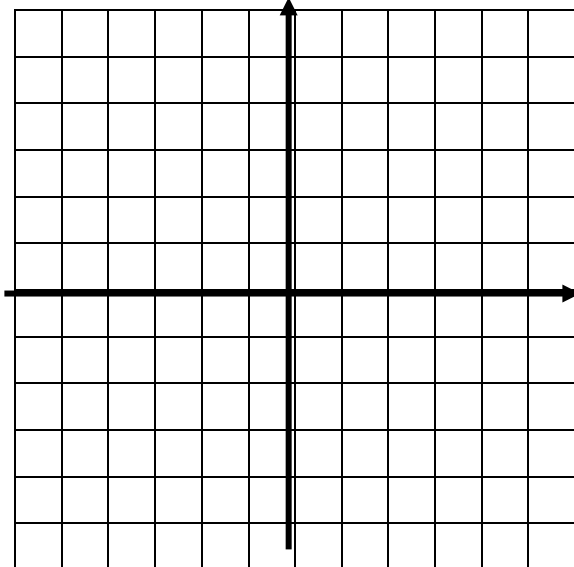
3.  $y = \sqrt{x}$



Domain \_\_\_\_\_

Range \_\_\_\_\_

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



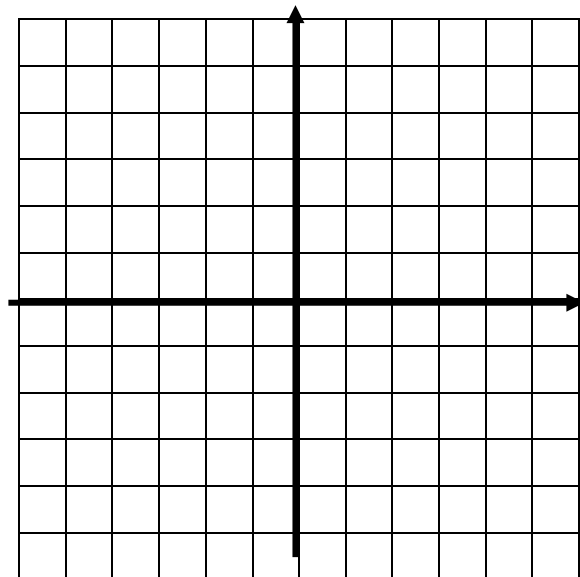
Domain \_\_\_\_\_

Range \_\_\_\_\_

## Calculus Summer Review Packet

Graph each function. Give its domain and range.

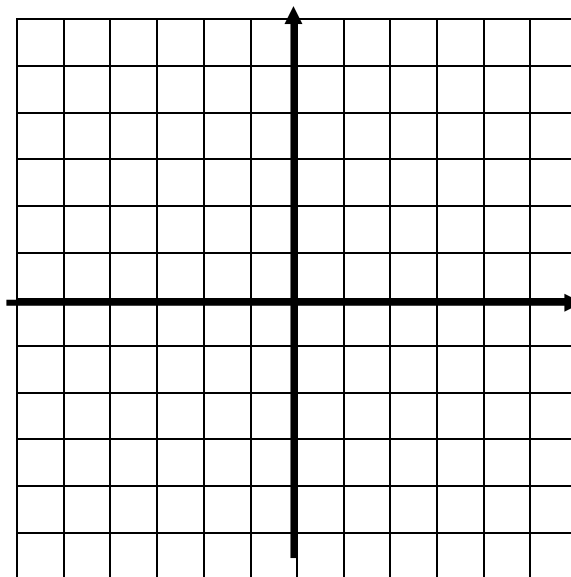
5.  $y = \ln x$



Domain \_\_\_\_\_

Range \_\_\_\_\_

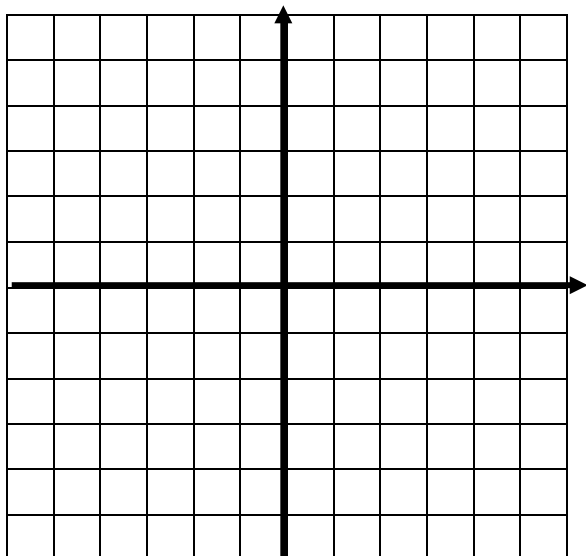
6.  $y = |x + 3| - 2$



Domain \_\_\_\_\_

Range \_\_\_\_\_

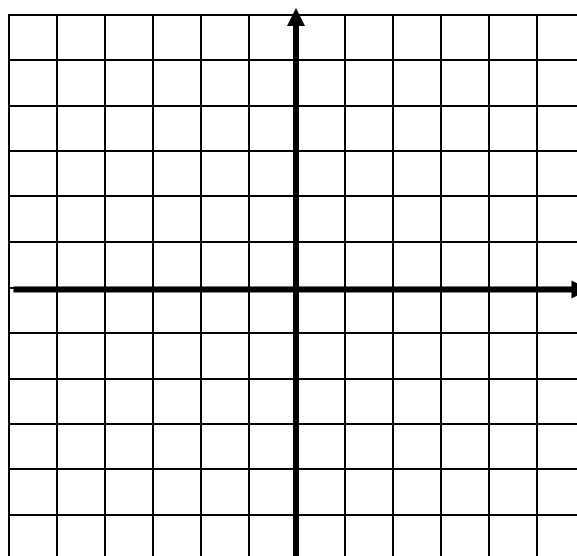
7.  $y = \frac{1}{x}$



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 \_\_\_\_\_

## Calculus Summer Review Packet

\* XVI. Identify, by name, each polar graph. Give at least one characteristic of each graph (e.g. radius, location, length of petal, point (other than the pole) on the graph, etc.)

1.  $r = 2$  \_\_\_\_\_

2.  $r = 3\sec \theta$  \_\_\_\_\_

3.  $r = 1 + \sin \theta$  \_\_\_\_\_

4.  $r = 2\cos 3\theta$  \_\_\_\_\_

***Congratulations!*** You have finished the calculus summer packet. Please use the space below if you would like to make some comments to your calculus teacher concerning the packet.

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