# NORTHEAST CONSORTIUM

# *AP Calculus AB or BC*

## Summer Pre-View Packet

# DUE THE FIRST DAY OF SCHOOL

The problems in this packet are designed to help you review topics from previous mathematics courses that are important to your success in

### *AP Calculus.*

DO ALL PROBLEMS WITHOUT A CALCULATOR. Show all work that leads you to each solution on separate sheets of paper. You may use your notes from previous mathematics courses to help you. You must do all work without any help from another person. Additional copies of this packet may be obtained from the Main Office in your school or printed from the school's website.

Springbrook: www.springbrookmath.org
Paintbranch: www.mcps.k12.md.us/schools/paintbranchhs
Blake: www.mcps.k12.md.us/schools/blakehs

ALL work should be completed and ready to turn in on the FIRST DAY of school. This packet will count as part of your first quarter grade.

# ENJOY YOUR SUMMER!! WE ARE LOOKING FORWARD TO SEEING YOU IN THE FALL.

Student Name:  _____

School:         _____

Date:           _____

**AP Calculus Summer Review**

Name _____     **SHOW ALL WORK.**

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

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

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

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

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

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.

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

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

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

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

IV. Solve for **z**:

1. $4x + 10y\mathbf{z} = 0$             2. $y^2 + 3y\mathbf{z} - 8\mathbf{z} - 4x = 0$

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

           determine each of the

       $h(x) = \{(3,2), (4,3), (1,6)\}$     $k(x) = x^2 + 5$        following:

1. $(f + h)(1) =$ _____        2. $(k - g)(5) =$ _____

3. $(f \circ h)(3) =$ _____        4. $(g \circ k)(7) =$ _____

5. $f^{-1}(x) =$ _____        6. $k^{-1}(x) =$ _____

                                     8. $(kg)(x) =$ _____

7. $\dfrac{1}{f(x)} =$ _____

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VI. Miscellaneous: Follow the directions for each problem.

1. Evaluate $\dfrac{f(x+h) - f(x)}{h}$ 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    $x = t^2 + 3$

                                                               $y = 2t$

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**AP Calculus Summer Review**

VII. Expand and simplify

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

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

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VIII. Simplify

1. $\dfrac{\sqrt{x}}{x}$ _____

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. $\ln \dfrac{1}{2}$ _____

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

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

11. $27^{2/3}$ _____

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

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

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

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,      4. _____
containing the point (3, 4)

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

1.  $\frac{1}{2}$ **v**          2.  **w** – **v**                3.  length of **w**          4. the unit vector
                                                                                    for **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 $\frac{7\pi}{6}$)      _____

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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. $y = \sqrt{x^2 + 4}$ | _____ | _____ |

XIII. Determine all points of intersection.

1. parabola $y = x^2 + 3x - 4$ and
   line $y = 5x + 11$

2. $y = \cos x$ and $y = \sin x$ in the
   first quadrant

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

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

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

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

  5.  $(x + 3)(x - 3) > 0$                                6.  $x^2 - 2x - 15 \le 0$

7.  $12x^2 = 3x$                                        8.  $\sin 2x = \sin x, \ 0 \le x \le 2\pi$

9.  $|x - 3| < 7$                                    10.  $(x + 1)^2(x - 2) + (x + 1)(x - 2)^2 = 0$

11.  $27^{2x} = 9^{x\text{-}3}$                               12.  $\log x + \log(x - 3) = 1$

**AP Calculus Summer Review**

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

1.  $y = \sin x$

2.  $y = e^x$

Domain_____

Range _____

Domain_____

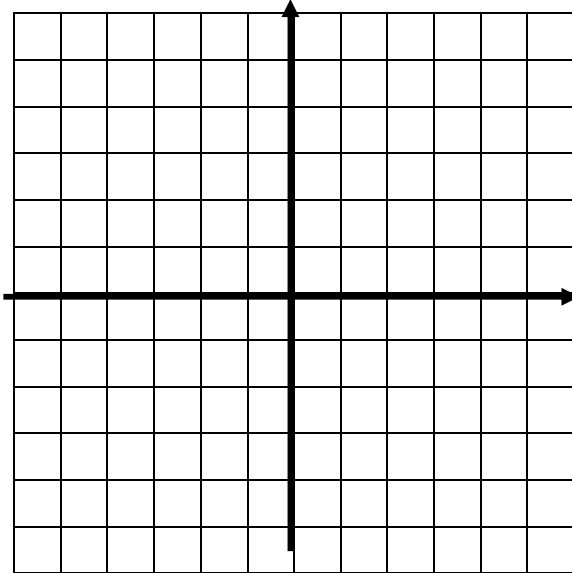Range _____

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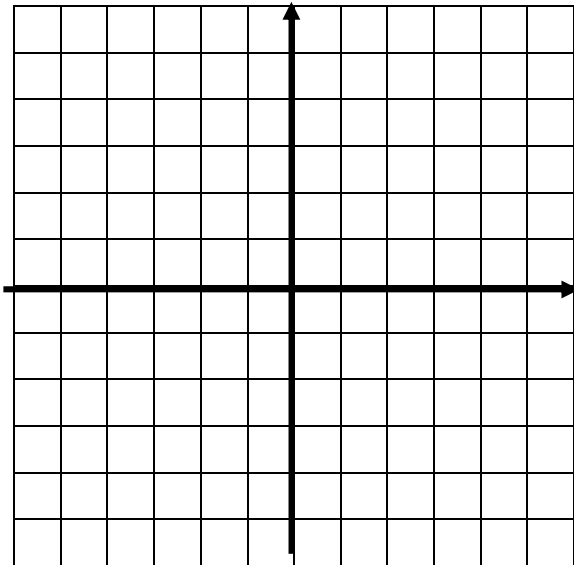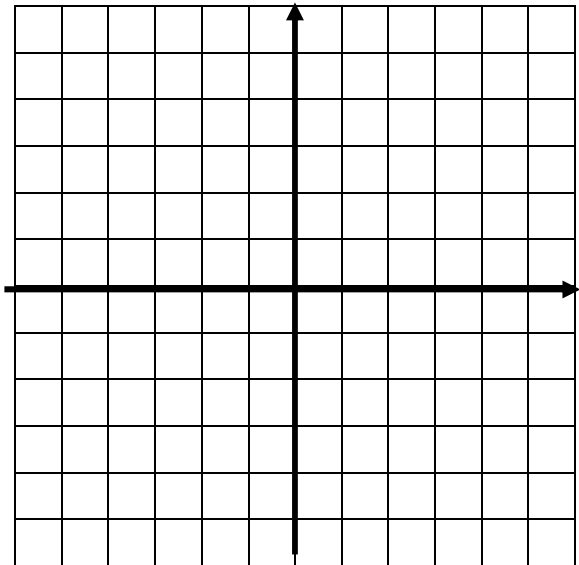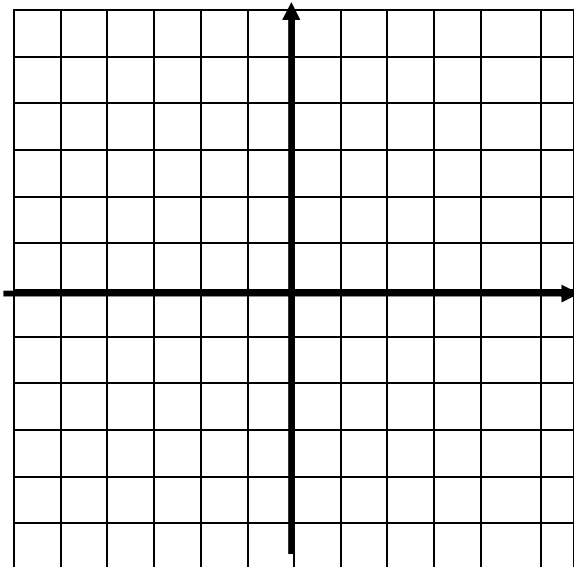
4.  $y = \sqrt[3]{x}$
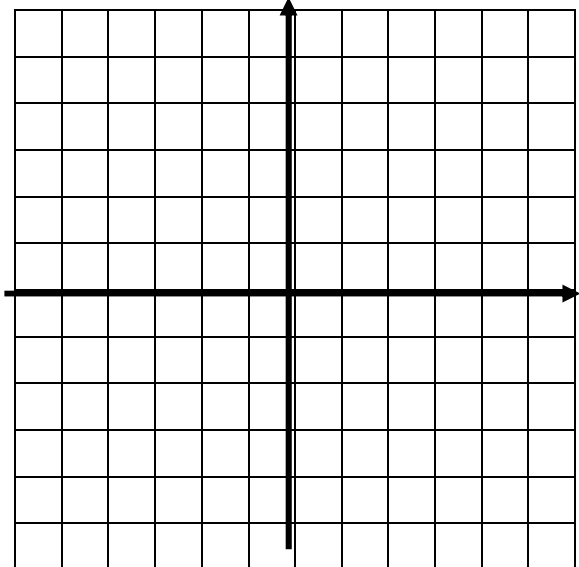
Domain_____

Range _____

Domain_____

Range _____

**AP Calculus Summer Review**

Graph each function.  Give its domain and range.

5. y = ln x
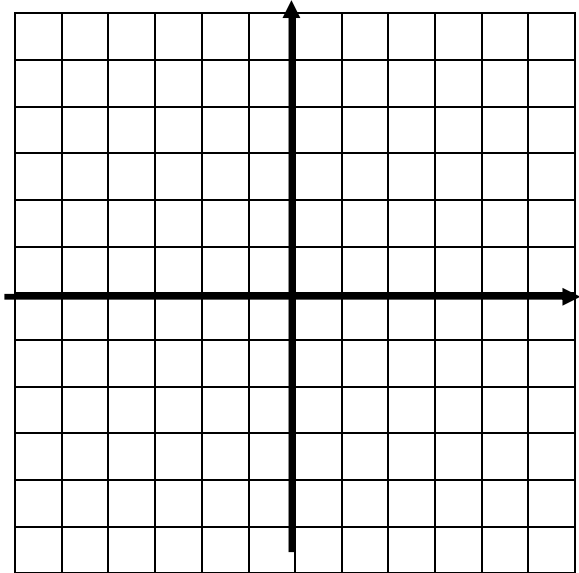
6. y = |x + 3| - 2

Domain_____

Domain_____

Range _____

Range _____

7.  $y = \dfrac{1}{x}$
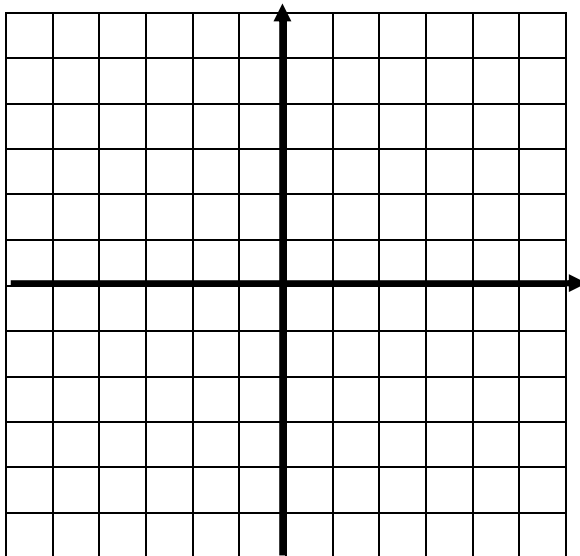
8.  $y = \begin{cases} x^2 & \text{if } x < 0 \\ x + 2 & \text{if } 0 \le x \le 3 \\ 4 & \text{if } x > 3 \end{cases}$

Domain_____

Domain_____

Range _____

Range _____

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.)  Then sketch a graph of each.

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.