



**Barberton High School
AP Calculus
Summer Review Packet**



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. Use your notes from previous math courses to help you. Do not use your calculator to solve these problems.

AP Calculus tests your knowledge of mathematics without using a calculator as well as with a calculator. After you have answered each question (especially the graphs), you may use your calculator to check your work. Use your calculator as a tool, not as a crutch. Please study the correct graphs so that you will be able to work with them without needing your calculator.

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

Enjoy your summer!

AP Calculus Summer Review Packet

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

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

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

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

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

II. Complete the following identities.

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

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

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

4. $\sin 2x =$ _____

5. $\cos 2x =$ _____ or _____ or _____

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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IV. Solve for z:

1. $4x + 10yz = 0$

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

V. If $f(x) = \{(3,5), (2,4), (1,7)\}$, $h(x) = \{(3,2), (4,3), (1,6)\}$, $g(x) = \sqrt{x-3}$, $k(x) = x^2 + 5$, determine each of the following:

1. $(f+h)(1) = \underline{\hspace{2cm}}$

2. $(k-g)(5) = \underline{\hspace{2cm}}$

3. $(f \circ h)(3) = \underline{\hspace{2cm}}$

4. $(g \circ k)(7) = \underline{\hspace{2cm}}$

5. $f^{-1}(x) = \underline{\hspace{2cm}}$

6. $k^{-1}(x) = \underline{\hspace{2cm}}$

7. $\frac{1}{f(x)} = \underline{\hspace{2cm}}$

8. $(kg)(x) = \underline{\hspace{2cm}}$

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 $\begin{matrix} x = t^2 + 3 \\ y = 2t \end{matrix}$.

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VII. Expand and simplify.

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

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

VIII. Simplify.

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

2. $e^{\ln 3}$ _____

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

4. $\ln 1$ _____

5. $\ln e^7$ _____

6. $\log_3\left(\frac{1}{3}\right)$ _____

7. $\log_{-2} 8$ _____

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

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

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

11. $27^{\frac{2}{3}}$ _____

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

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

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

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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 $v = -2i + 5j$ and $w = 3i + 4j$, determine

1. $\frac{1}{2}v$ _____ 2. $w - v$ _____

 3. length of w _____ 4. the unit vector v _____
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XI. Without a calculator (as for the entire packet), 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. $\cos \frac{7\pi}{6}$ _____ 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. Determine the domain and range for each function. [Hint: Square both sides. Consider the resulting conic.]

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 the points of intersection. Sketch the graph of each system of equations.

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

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

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

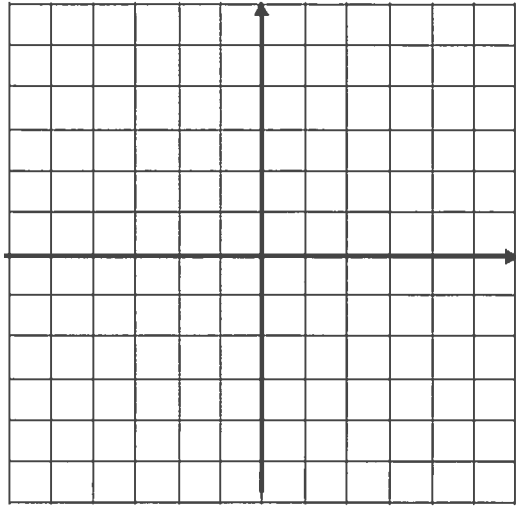
13. $e^{3k} = 5$

14. $2\ln(x+1) = 4\ln 5$

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

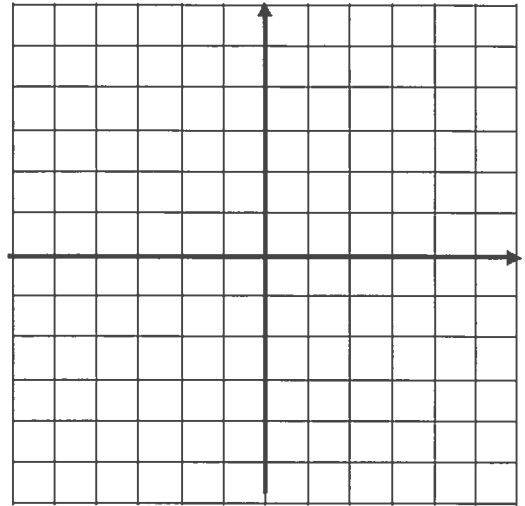
1. $y = \sin x$



Domain _____

Range _____

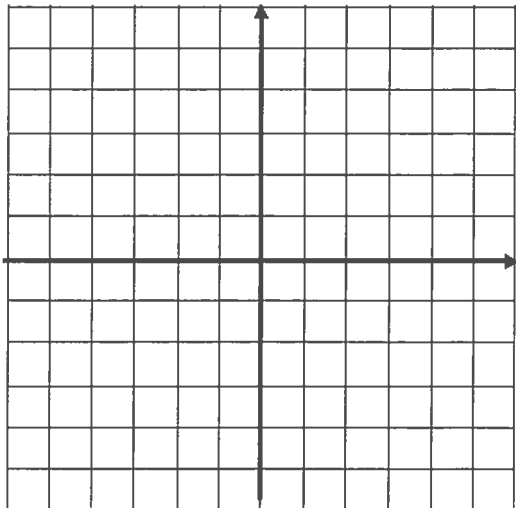
2. $y = e^x$



Domain _____

Range _____

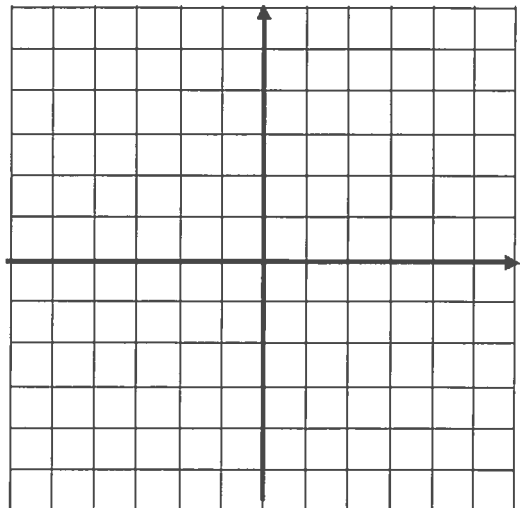
3. $y = \sqrt{x}$



Domain _____

Range _____

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

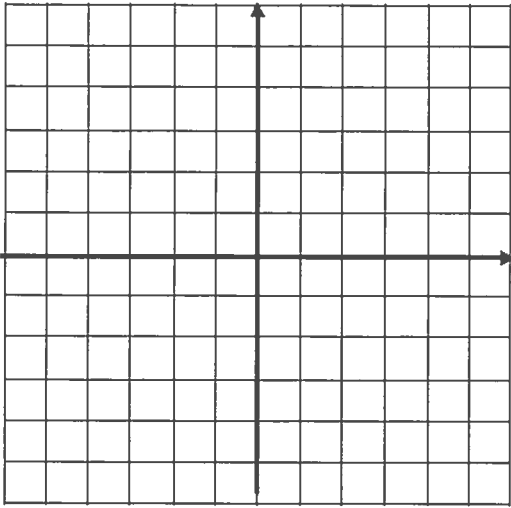


Domain _____

Range _____

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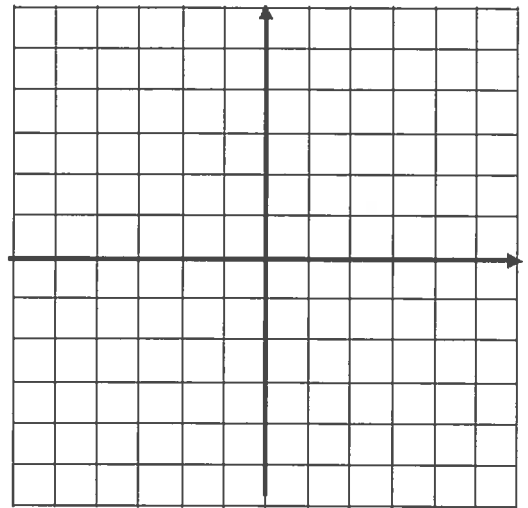
5. $y = \ln x$



Domain _____

Range _____

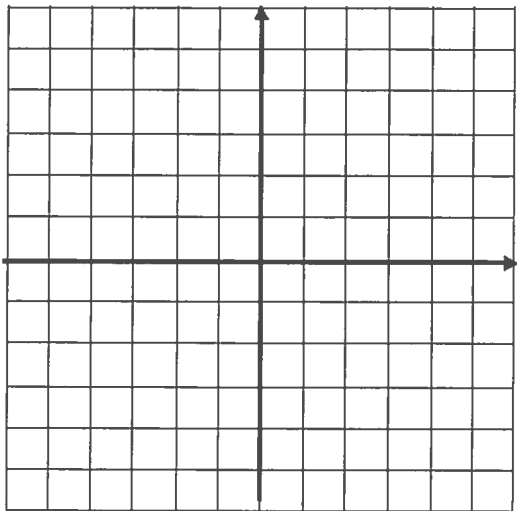
6. $y = |x+3| - 2$



Domain _____

Range _____

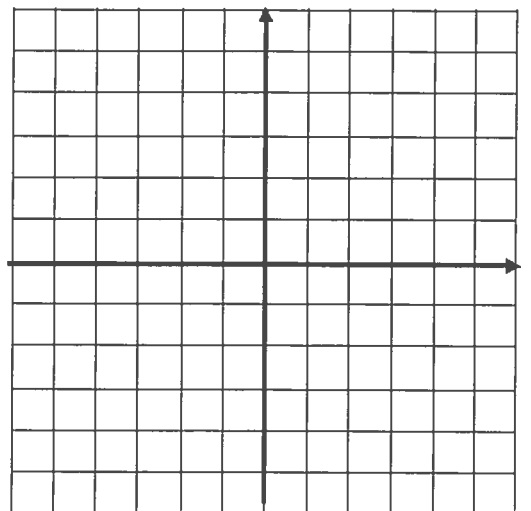
7. $y = \frac{1}{x}$



Domain _____

Range _____

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



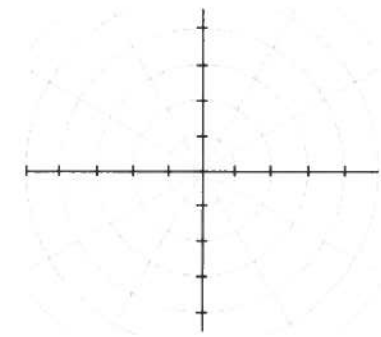
Domain _____

Range _____

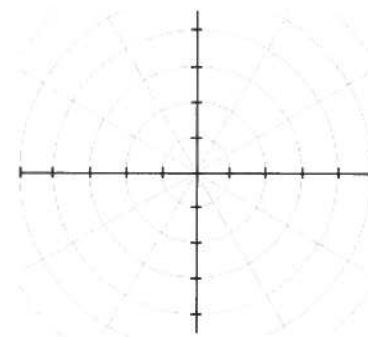
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XVI. Identify, by name, each polar graph. Give at least one characteristic of each graph (e.g. radius, location, length of petal, point (other than the pole) on the graph etc.) Sketch the graph.

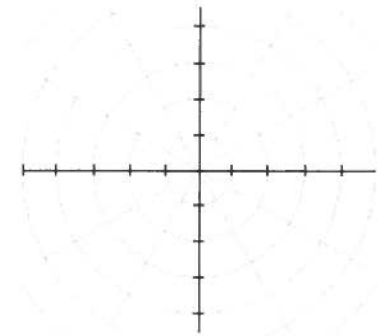
1. $r = 4$



2. $r = 2 + 2\sin\theta$



3. $r = 3\sin\theta$



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

