

AP Calculus Summer Review Packet

Paint Branch High School

2004

Name _____

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. Use your notes from previous math courses to help you. The internet has many good sources for information on these topics.

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) without using your calculator, you may use your calculator to check your work. If you use your calculator as a crutch, instead of a tool, and just copy from the screen, you will lose this valuable diagnostic help. Please study the correct graphs so that you will be able to work with them without needing your calculator.

Additional copies of this review packet can also be printed from the Paint Branch High School website (in pdf)

at: www.mcps.k12.md.us/schools/paintbranchhs/

Bring this packet with you on the first day of school.

Get ready for calculus, an exciting adventure in learning mathematics!

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. $\cos 2x =$ _____ or _____

5. $\sin 2x =$ _____

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

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

determine each of the following:

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

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

1. $(f + h)(1) =$ _____

2. $(k - g)(5) =$ _____

3. $(f \cdot h)(3) =$ _____

4. $(g \cdot k)(7) =$ _____

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

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

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

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

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 $x = t^2 + 3$
 $y = 2t$

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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. $\log_3(1/3)$ _____

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. $27^{2/3}$ _____

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

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

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

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XII. Determine domain and range for each function. [Hint: Square both sides. Consider the resulting conic.] Sketch graph of each conic where $y \geq 0$.

Function	Sketch	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. 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 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. $\frac{x^4 - 1}{x^3}$ |
| 3. $(x - 5)^2 = 9$ | 4. $2x^2 + 5x = 8$ |

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

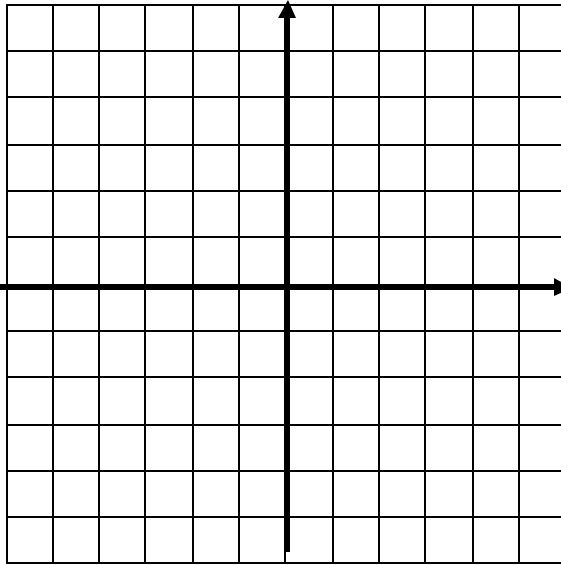
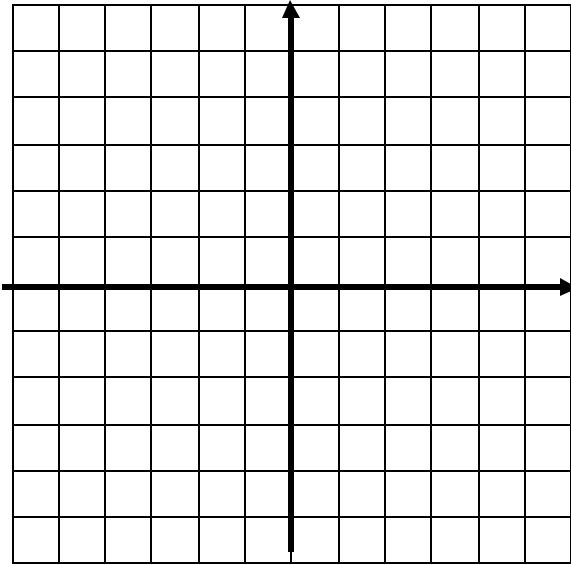
12. $\log x + \log(x - 3) = 1$

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

1. $y = \sin x$

2. $y = e^x$



Domain _____

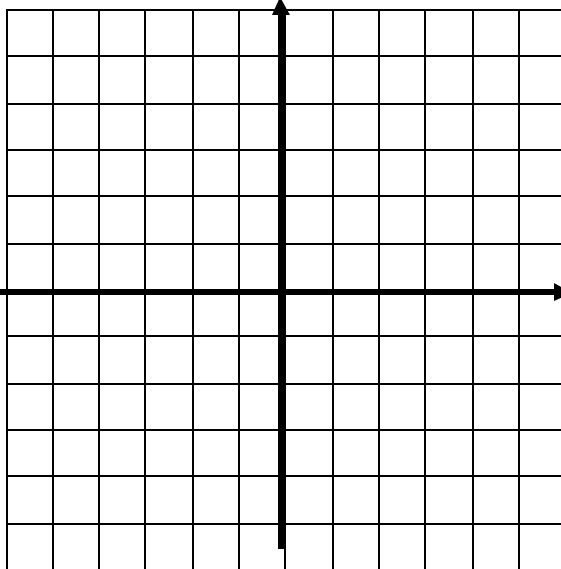
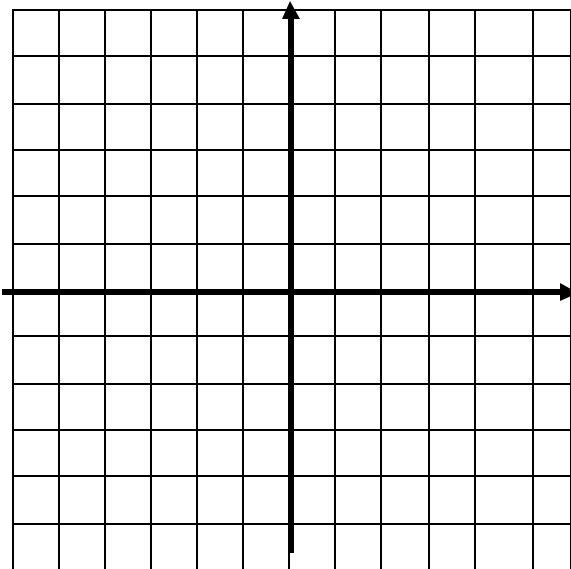
Domain _____

Range _____

Range _____

3. $y = \sqrt{x}$

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



Domain _____

Domain _____

Range _____

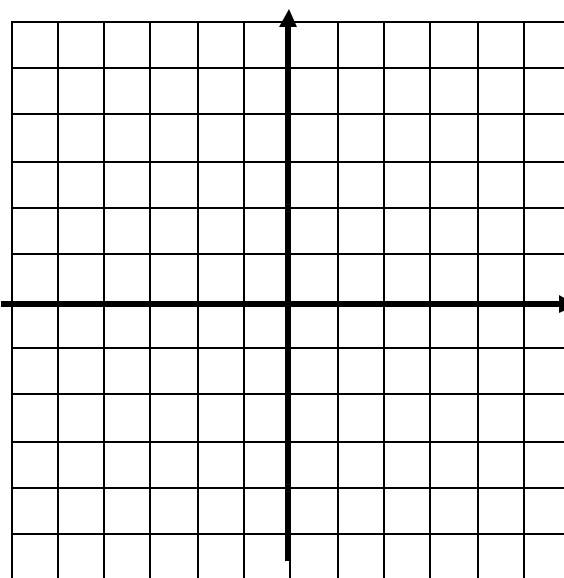
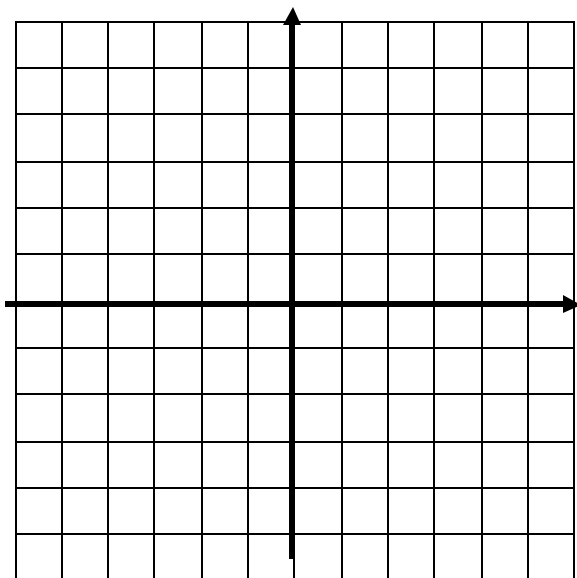
Range _____

Graph each function. Give its domain and range.

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5. $y = \ln x$

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



Domain _____

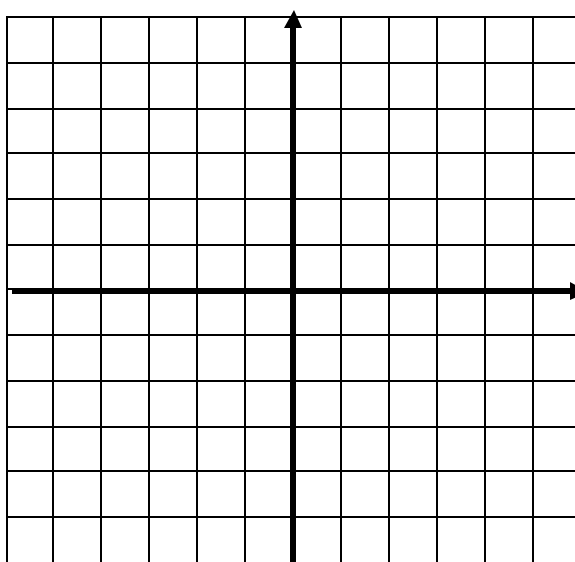
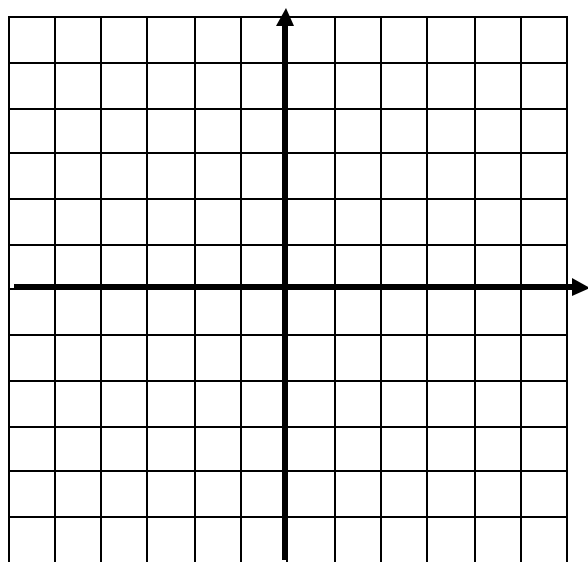
Domain _____

Range _____

Range _____

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

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 _____

Domain _____

Range _____

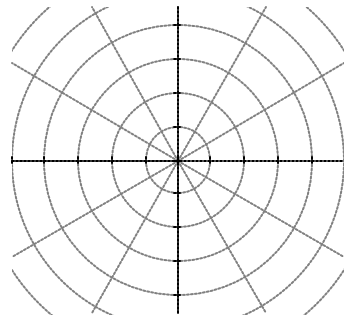
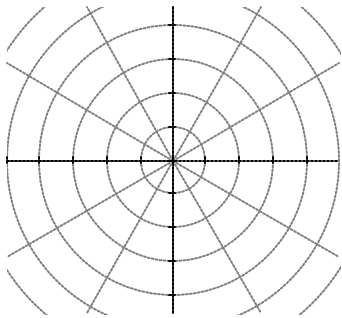
Range _____

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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 each graph.

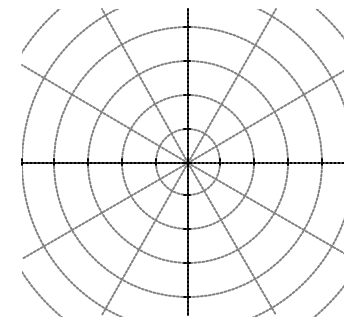
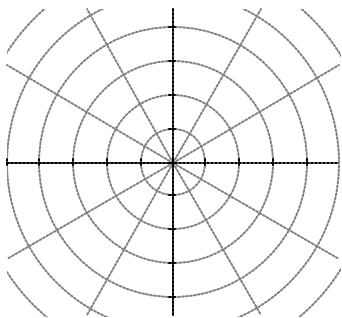
1. $r = 4$ _____

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



2. $r = 3 \sin ?$ _____

4. $r = 4 \cos 3 ?$ _____



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.

