

Summer Review Packet

Calculus with Applications

The problems in this packet are designed to help you review topics that are important to your success in Calculus. You must know how to do all these problems WITHOUT a calculator.

If you need help with any of the problems, check the Poolesville web site for links to on-line classes at Montgomery College, which are available to you free of charge. You may also e-mail Mrs. Loomis at Linda L Loomis@mcpsmd.org with questions.

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

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

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

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

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

II. 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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III. 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. $\sin 2x =$ _____

IV. Solve for **z**.

1. $4x + 10yz = 0$

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

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

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

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

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

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

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. Blank!!

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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 $(3, 4)$ 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. _____

IX. 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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X. 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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XI. 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. $\sin 2x = \sin x$, $0 \leq x \leq 2\pi$

9. $|x - 3| < 7$

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

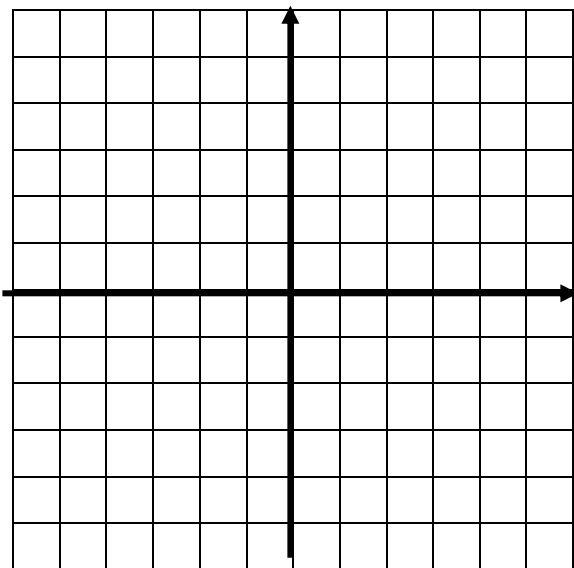
11. $27^{2x} = 9^{x-3}$

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

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

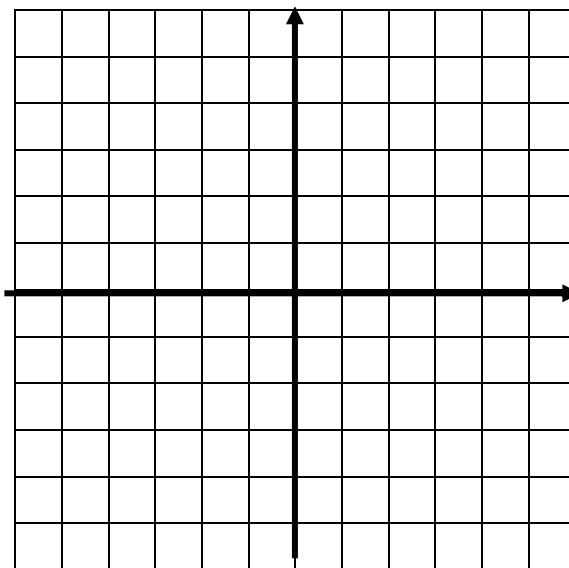
1. $y = \sin x$



Domain _____

Range _____

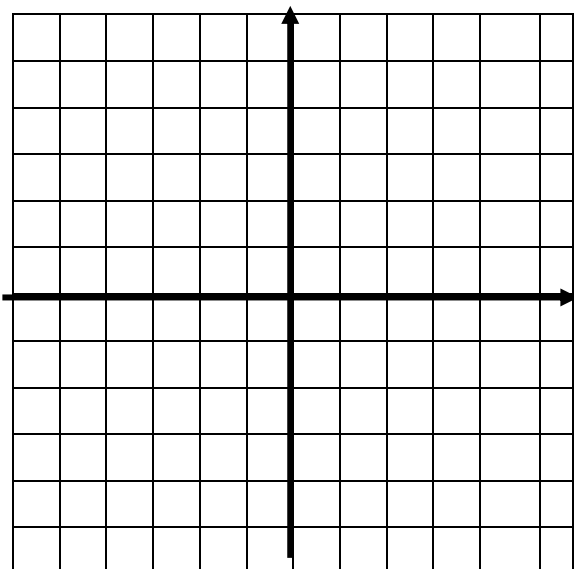
2. $y = e^x$



Domain _____

Range _____

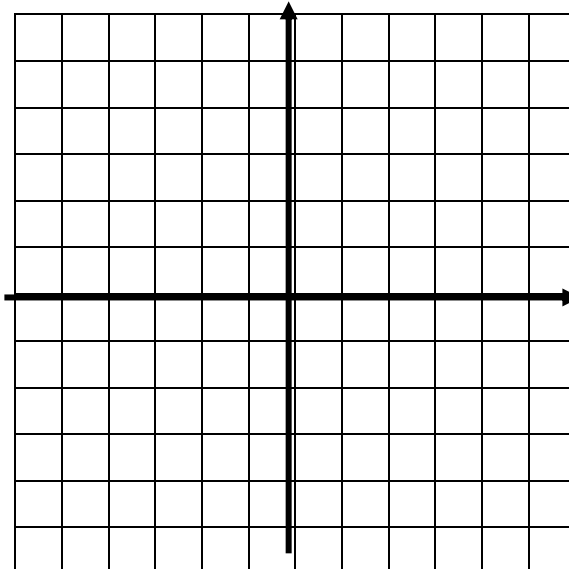
3. $y = \sqrt{x}$



Domain _____

Range _____

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

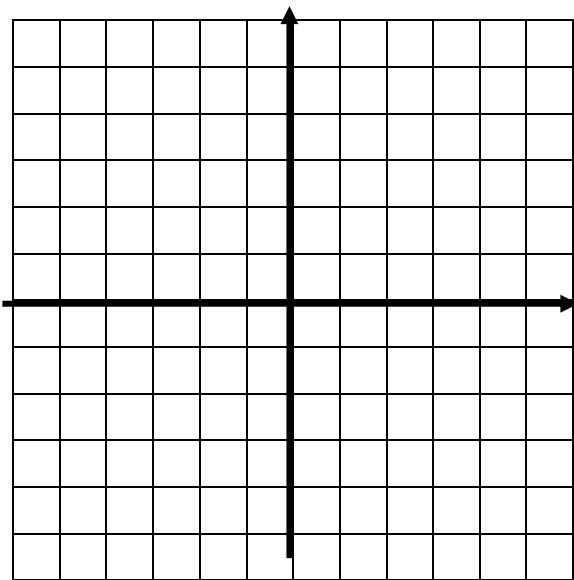


Domain _____

Range _____

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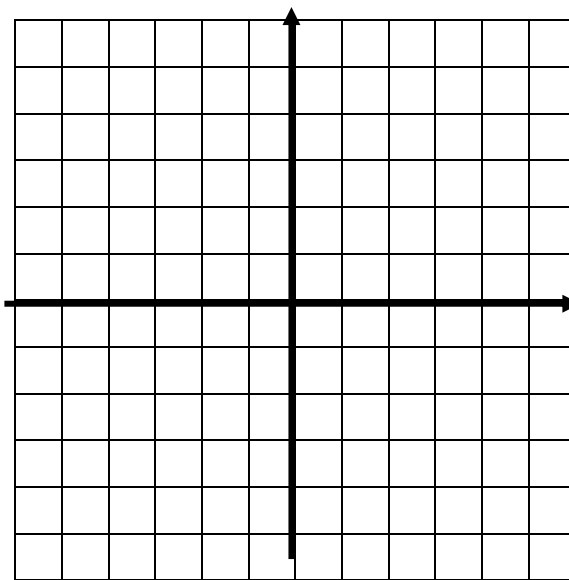
5. $y = \ln x$



Domain _____

Range _____

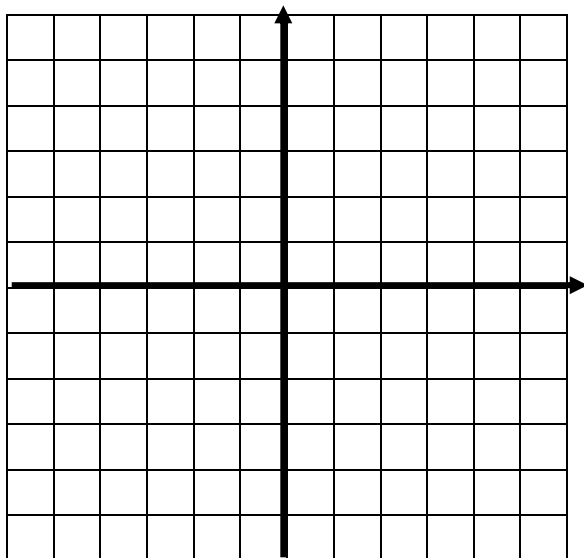
6. $y = |x + 3| - 2$



Domain _____

Range _____

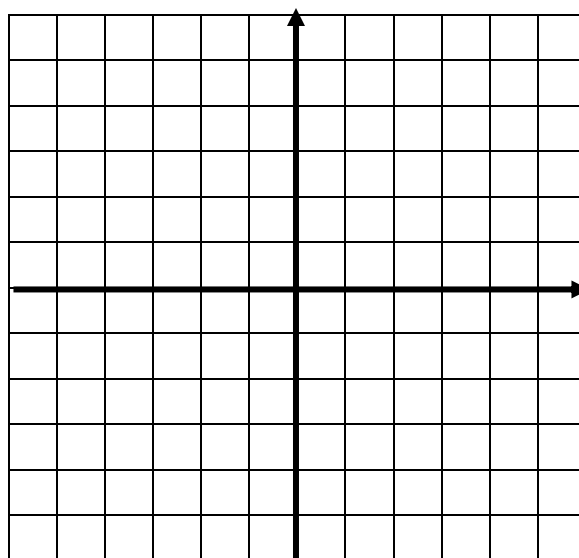
7. $y = \frac{1}{x}$



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 _____