

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

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

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

Calculus Summer Review Packet

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

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. _____

or _____

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

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

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}

XI. Without a calculator (as for 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 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. $(x + 1)^2(x - 2) + (x + 1)(x - 2)^2 = 0$

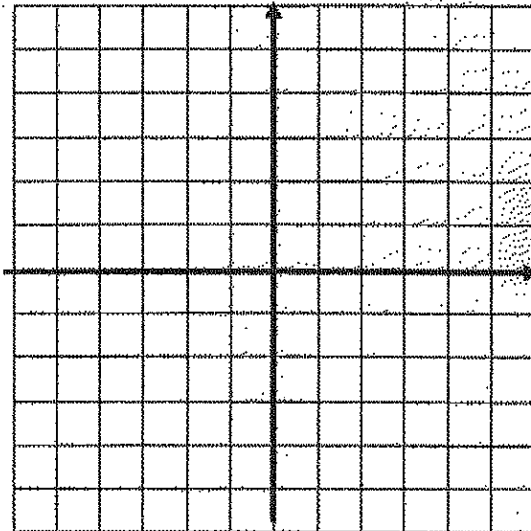
11. $27^{2x} = 9^{x-3}$

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

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

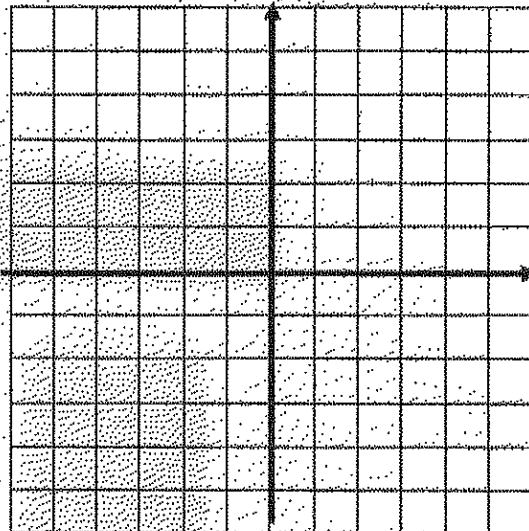
1. $y = \sin x$



Domain _____

Range _____

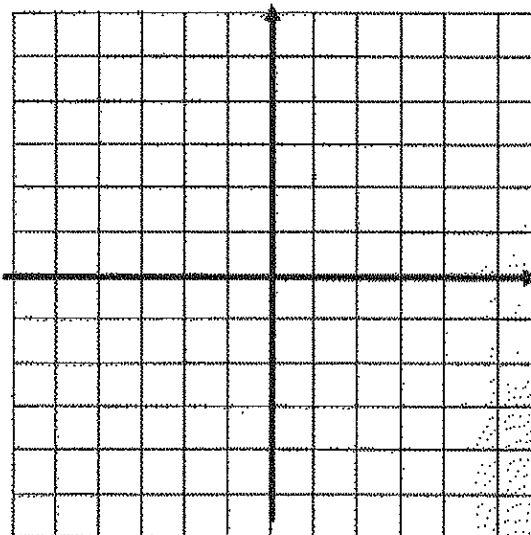
2. $y = e^x$



Domain _____

Range _____

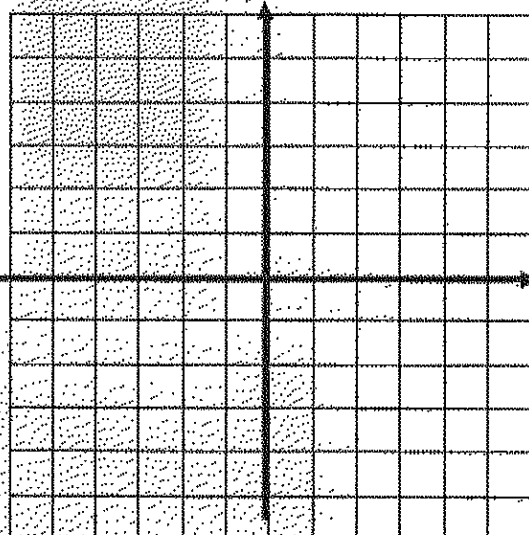
3. $y = \sqrt{x}$



Domain _____

Range _____

4. $y = \sqrt{x}$



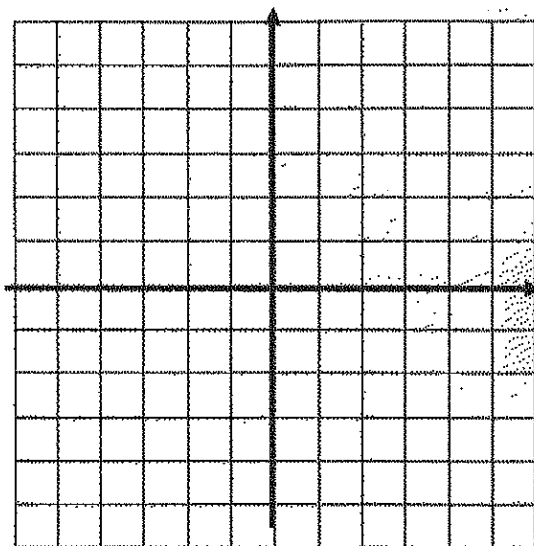
Domain _____

Range _____

Graph each function. Give its domain and range.

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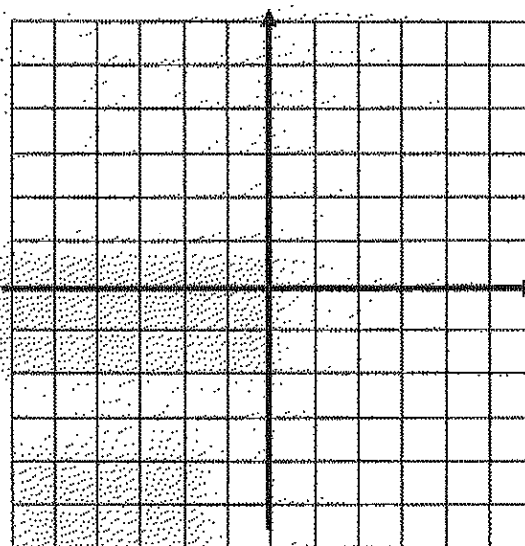
5. $y = \ln x$



Domain _____

Range _____

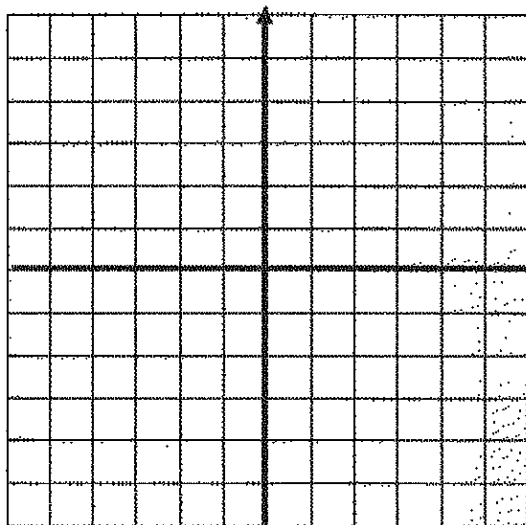
6. $y = |x + 3| - 2$



Domain _____

Range _____

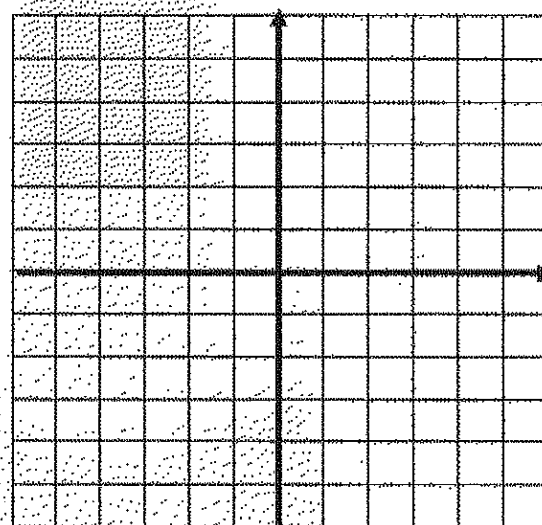
7. $y = \frac{1}{x}$



Domain _____

Range _____

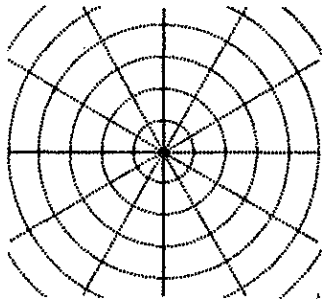
8. $y = \begin{cases} x^2 & \text{if } x < 0 \\ x + 2 & \text{if } 0 \leq x \leq 3 \\ 4 & \text{if } x > 3 \end{cases}$



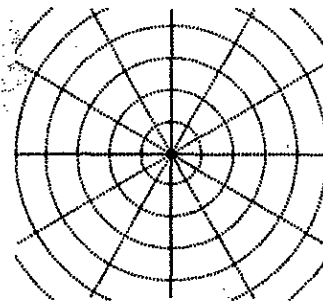
Domain _____

Range _____

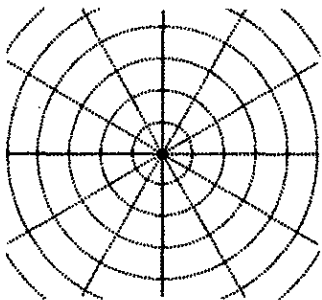
1. $r = 4$ _____



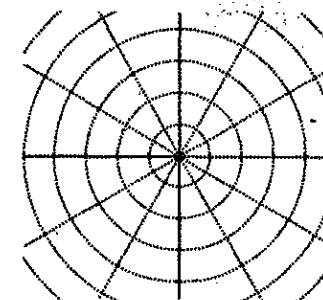
2. $r = 2 + 2 \sin \theta$ _____



3. $r = 3 \sin \theta$ _____



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



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.
