Calculus Summer Review Packet

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

1. $\dfrac{3x^2 + 10x + 8}{6x^2 + 17x + 10}$

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

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

4. $\dfrac{2x^2 + x - 12}{x^2 - 16}$

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 = $ _____ or _____ or _____

III.   Simplify each expression.

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

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. $4x + 10yz = 0$

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

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

V. If $\quad h(x) = \{(3,2), (4,3), (1,6)\}$ $\qquad$ determine each of the following:

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

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

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

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

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

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

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

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

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

V. Miscellaneous: Follow the directions for each problem.

1. Expand $(x+y)^3$

2. Simplify $x^{\frac{3}{2}}\left(x + x^{\frac{5}{2}} - x^2 \right)$

3. Evaluate $f(x+h)$ if $f(x) = x^2 - 2x$

VI.   Simplify.

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

2. $e^{\ln 3}$

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

4. $\ln 1$

5. $\ln e^7$

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

7. $\log_{-2} 8$

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

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

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

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

12. $\left(5a^{\frac{2}{3}}\right)^{\frac{3}{2}}$

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

VII.   Using the point slope form $y - y_1 = m(x - x_1)$, write an equation for each line.

     1. with slope of -2, containing the point (3,4)

     2. containing the points (1,-3) and (-5,2)

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

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

VIII.   Given the vectors $\vec{v} = -2\vec{i} + 5\vec{j}$ and $\vec{w} = 3\vec{i} + 4\vec{j}$, determine

1. $\dfrac{1}{2}\vec{v}$

2. $\vec{w} - \vec{v}$

3.   length of $\vec{w}$

4.   the unit vector for $\vec{v}$

IX.   Without a calculator (as for the entire packet), determine the value of each expression.

1. $\sin 0$

2. $\sin\dfrac{\pi}{2}$

3. $\sin\dfrac{3\pi}{4}$

4. $\cos\pi$

5. $\cos\dfrac{7\pi}{6}$

6. $\cos\dfrac{\pi}{3}$

7. $\tan\dfrac{7\pi}{4}$

8. $\tan\dfrac{\pi}{6}$

9. $\tan\dfrac{2\pi}{3}$

10. $\cos\left(Sin^{-1}\dfrac{1}{2}\right)$

11. $Sin^{-1}\left(\sin\dfrac{7\pi}{6}\right)$

15. $\sin\left(Arc\tan\dfrac{-3}{4}\right)$

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X.   For each function, determine the domain and range.

1. $f(x) = \sqrt{x-4}$

Domain: _____

Range: _____

2. $g(x) = \sqrt{x^2 - 4}$

Domain: _____

Range: _____

3. $h(x) = \sqrt{4 - x^2}$

Domain: _____

Range: _____

4. $k(x) = \sqrt{x^2 + 44}$

Domain: _____

Range: _____

XI.   Determine the coordinates of all points of intersection of:

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

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

XII.   Solve all equations below for *x*, where *x* is a real number.

1. $x^2 + 3x - 4 = 14$

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

3. $(x-5)^2 - 9 = 0$

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

5. $x^2 - 2x - 15 < 0$

6. $\dfrac{x-3}{x-1} \leq \dfrac{4}{x+8}$

7. $12x^2 = 3x$

8. $\sin 2x = \cos x$

9. $|x-3| < 7$

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

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

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

XIII.   Graph each equation. Give its domain and range. Scale all graphs by one unless a scale is provided.

1. $y = \sin x$

  Domain: _____

  Range: _____
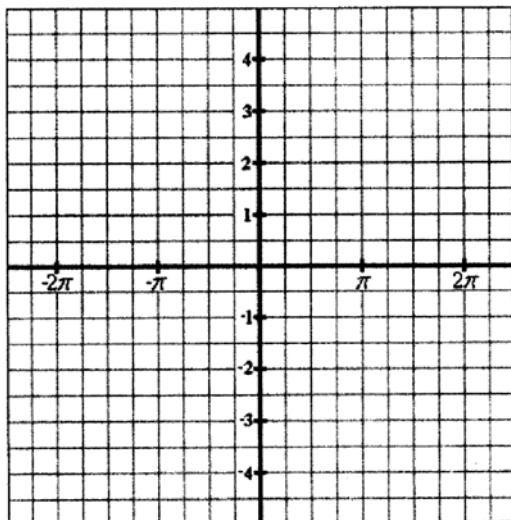
2. $y = \csc x$

  Domain: _____

  Range: _____
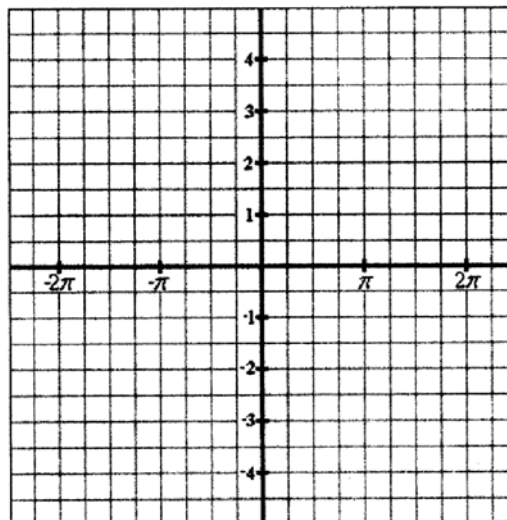
3. $y = \cos x$

  Domain: _____

  Range: _____
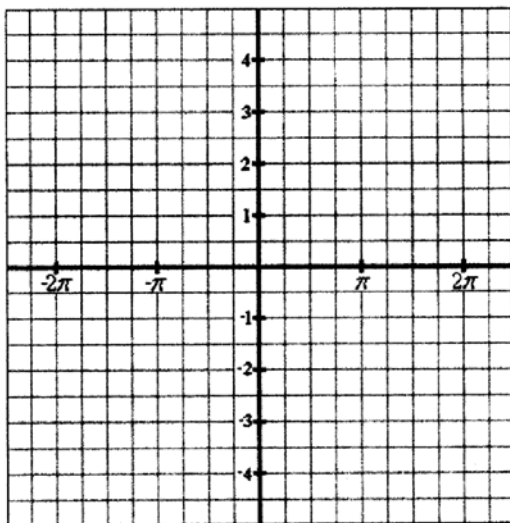
4. $y = \sec x$

  Domain: _____

  Range: _____
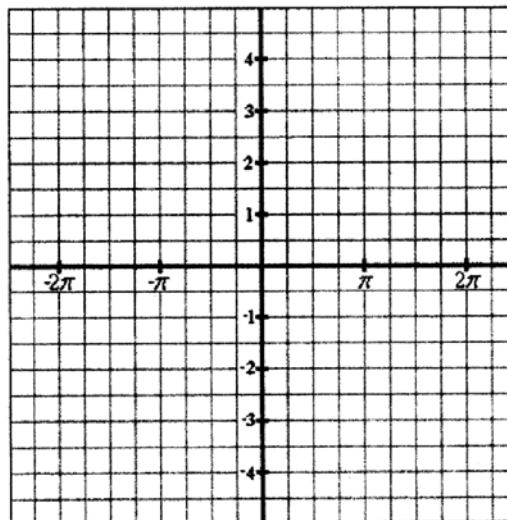
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5. $y = \tan x$

    Domain: _____

    Range: _____
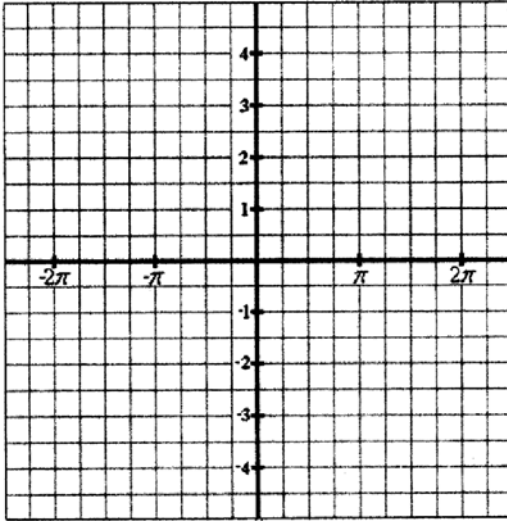
6. $y = \cot x$

    Domain: _____

    Range: _____
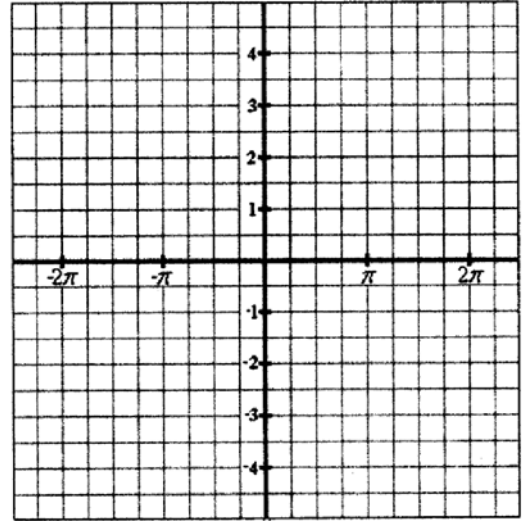
7. $y = \sqrt{x}$

    Domain: _____

    Range: _____

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

    Domain: _____

    Range: _____
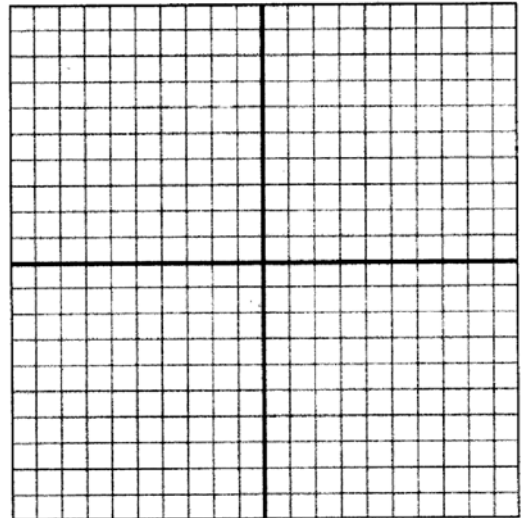
9. $y = |x + 3| - 2$
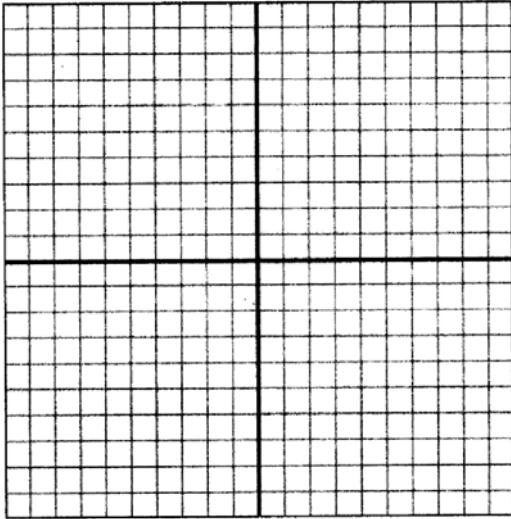
        Domain: _____

        Range: _____

10. $y = e^x$

        Domain: _____

        Range: _____
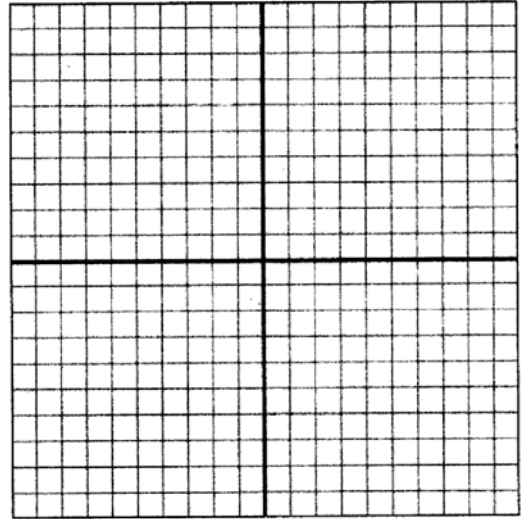
11. $y = \ln x$

        Domain: _____

        Range: _____
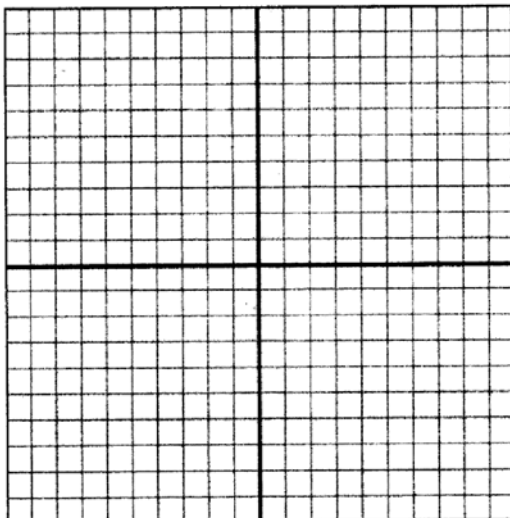
12. $x^2 + y^2 = 25$

        Domain: _____

        Range: _____
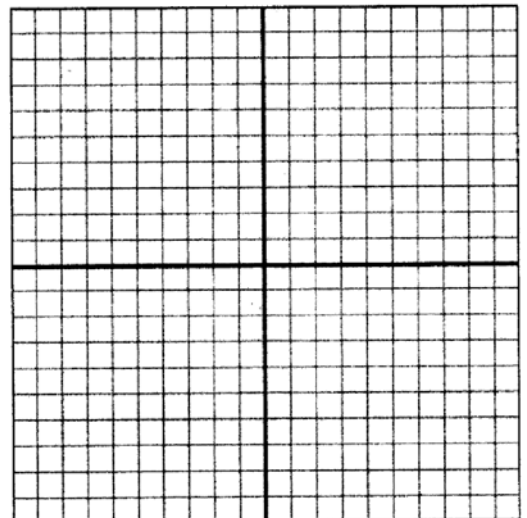
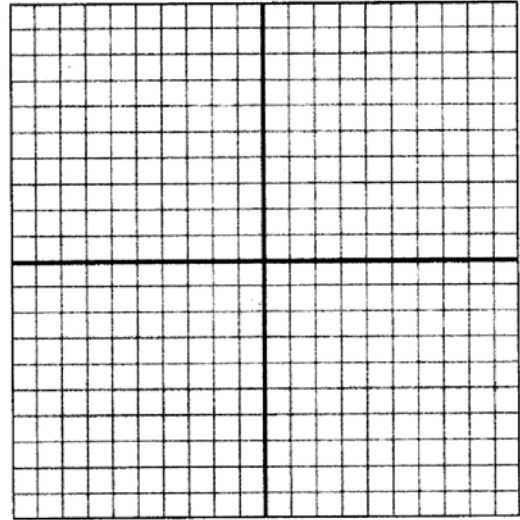13. $y = \dfrac{1}{x}$
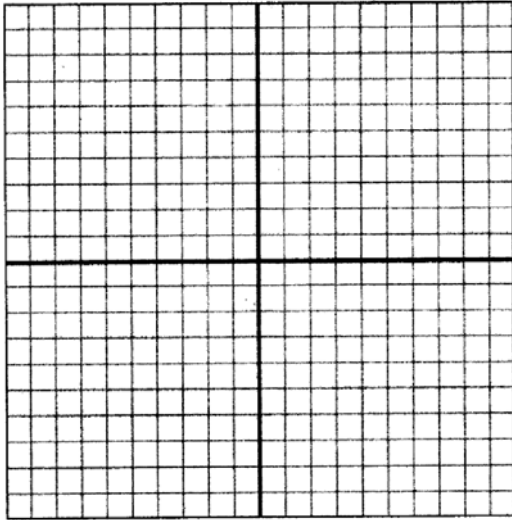
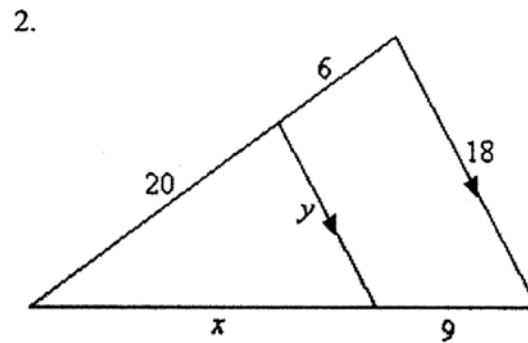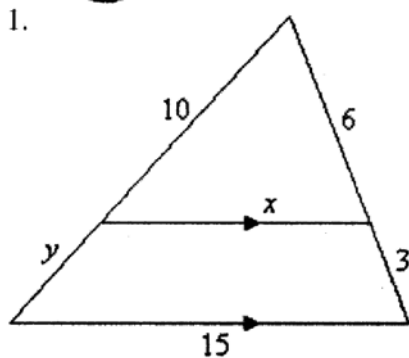Domain: _____

Range: _____

14. $y = \begin{cases} x^2 & x < 0 \\ x+2 & 0 \le x \le 3 \\ 4 & x > 3 \end{cases}$

Domain: _____

Range: _____

XIV. Solve for *x* and *y* in the triangles below.
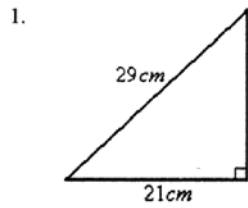
1.

10, 6, x, y, 3, 15

2.

6, 18, 20, y, x, 9

XV.   Find the area of the figures below.

1.

29 cm

21cm

2.

$r = 6cm$

3.

10in   10in

10in

4.

12cm

15cm

17cm

20cm
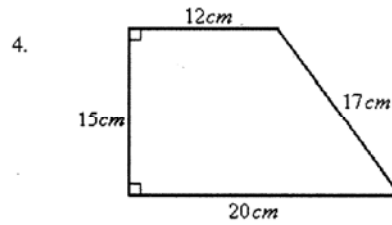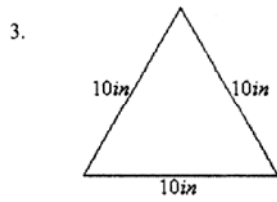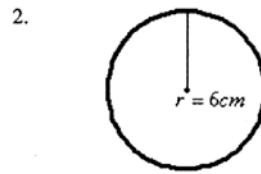
XVI.   Find the volume of the solids below.

1.

6cm

2.

10cm

6cm

3.

4cm

10cm

4.

5in

12in

4in