Name: _____

Sterling High School

Summer Review Packet

Calculus Honors

The completion of this review packet is a requirement for all students enrolled in Calculus at Sterling High School. It is a review of the essential mathematical skills necessary for success in Calculus.

This packet is a graded assignment, and it must be completed to receive full credit. Please show all work for each problem. The teacher will quickly review the material in the packet and an assessment will be given after the topics have been reviewed.

Additionally all students should have the unit circle memorized and be comfortable using radian angle measure.

This packet is due the 1st day of class

Have a wonderful summer and GO KNIGHTS!

Show all work for each problem to receive credit for answers. Unless otherwise specified, all answers should be exact values.

1. Use an absolute value to define the given interval: All numbers that are at most ten units from 15.

   _____

2. Solve the following. Write the solution in <u>interval notation</u>.
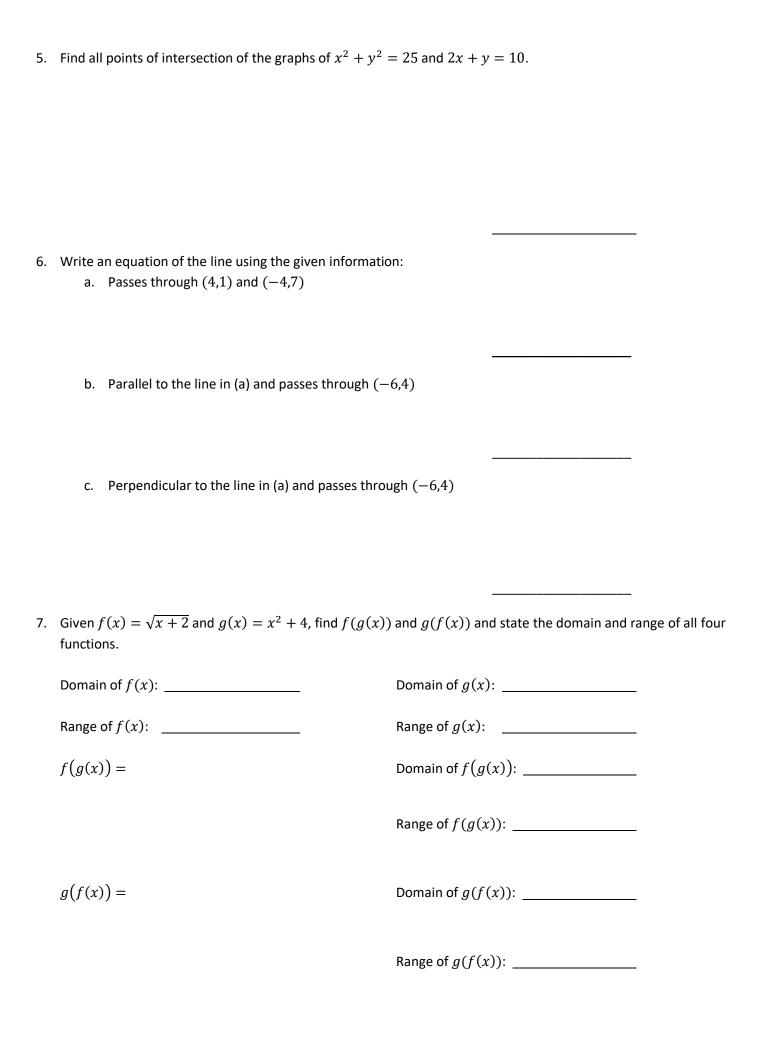   a. $|3x + 1| \geq 4$

   _____
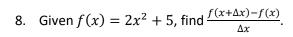
   b. $x^2 + x - 1 < 5$

   _____

3. Sketch the graph of the following equations. Identify any intercepts, test for symmetry and determine if the function is even, odd, or neither:

   a. $y = \sqrt{9 - x^2}$

   Even   Odd   Neither

   Intercepts: _____

   Symmetry: _____

   b. $y = 2x^3 - x$

   Even   Odd   Neither

   Intercepts: _____

   Symmetry: _____

4. Find the intercepts of $y = \dfrac{x^2 - 9}{x + 1}$

   _____

5. Find all points of intersection of the graphs of $x^2 + y^2 = 25$ and $2x + y = 10$.

_____

6. Write an equation of the line using the given information:
   a. Passes through $(4,1)$ and $(-4,7)$

_____

   b. Parallel to the line in (a) and passes through $(-6,4)$

_____

   c. Perpendicular to the line in (a) and passes through $(-6,4)$

_____

7. Given $f(x) = \sqrt{x+2}$ and $g(x) = x^2 + 4$, find $f(g(x))$ and $g(f(x))$ and state the domain and range of all four functions.

Domain of $f(x)$: _____   Domain of $g(x)$: _____

Range of $f(x)$: _____   Range of $g(x)$: _____

$f(g(x)) =$ Domain of $f(g(x))$: _____

                                          Range of $f(g(x))$: _____

$g(f(x)) =$ Domain of $g(f(x))$: _____

                                          Range of $g(f(x))$: _____

8. Given $f(x) = 2x^2 + 5$, find $\frac{f(x+\Delta x)-f(x)}{\Delta x}$.

_____

Simplify the given expressions and make sure to have a common denominator.

9. $\frac{x^2-5x+4}{x^2-2x-8}$

_____

10. $\frac{\frac{1}{x+4}-\frac{1}{4}}{x}$

_____

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

_____

12. $x^{-1/2} - \frac{5}{2}x^{-3/2}$ _____

13. $x^4 \left[\frac{(x+1)-(x-1)}{(x+1)^2}\right] + \left[\frac{x-1}{x+1}\right](4x^3)$ _____

14. Find the exact value of each of the remaining trig functions.

    a. $\cos\theta = -\frac{4}{5}, \sin\theta < 0$ $\sin\theta = $ _____ $\csc\theta = $ _____

                                                $\tan\theta = $ _____ $\sec\theta = $ _____

                                                              $\cot\theta = $ _____

    b. $\tan\theta = -\frac{5}{12}, \cos\theta < 0$ $\sin\theta = $ _____ $\csc\theta = $ _____

                                                $\cos\theta = $ _____ $\sec\theta = $ _____

                                                              $\cot\theta = $ _____

15. Find the exact value of each expression. Do not use a calculator.

   a. $3 \sin \frac{\pi}{3} - 4 \cos \frac{3\pi}{2}$

   _____

   b. $\sin\left(-\frac{\pi}{3}\right) - \cot\left(-\frac{5\pi}{4}\right)$

   _____

16. Solve each equation in the interval $0 \le \theta \le 2\pi$ in radians. Do not use a calculator.

   a. $\tan \theta = -\frac{1}{\sqrt{3}}$

   _____

   b. $\sec \theta = \sqrt{2}$

   _____

   c. $\sin^2 \theta - 1 = 0$

   _____

d. $\tan^2 \theta = 3$ _____

e. $-\sin \theta = \cos 2\theta$ _____

f. $\sin 2\theta - \cos \theta = 0$ _____

17. Use a calculator to approximate two values of θ in the interval $0 < \theta < 2\pi$ that satisfy the equation. Round your answers to three decimal places.

a. $\sin \theta = 0.8191$ _____

b. $\cos \theta = 0.8746$ _____

c. $\tan \theta = 0.6524$ _____

d. $\sec \theta = -1.2241$ _____

18. In traveling across flat land, you notice a mountain directly in front of you. Its angle of elevation (to the peak) is 3.5 degrees. After you drive 13 miles closer to the mountain, the angle of elevation is 9 degrees. Approximate the height of the mountain.

19. Let θ be an angle in standard position on the coordinate axis. The terminal side of the angle passes through the point $(-8, -15)$. Draw θ and determine all six trigonometric functions for the angle.

$\sin \theta = $ _____ $\csc \theta = $ _____

$\cos \theta = $ _____ $\sec \theta = $ _____

$\tan \theta = $ _____ $\cot \theta = $ _____