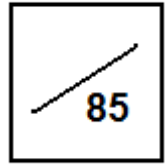


- ▶ This assignment is to be written up individually ( I should not see identical papers ).
- ▶ Work primarily by yourself. You may ask a question of Mr. Hamilton before or after school, but you should not “give away” how to do problems to your peers.
- ▶ Points will be earned for each of your solution process, explanation, and answer.  
*An answer alone will not be enough to earn a decent grade!*
- ▶ Please do all work on separate sheets of paper and attach this to the front. (Exceptions noted.)
- ▶ Please be organized and have all problems submitted sequentially!! (1, 2, 3, 4,...)
- ▶ This is due at the beginning of class Tuesday. Assignments turned late are automatically deducted 50% of the possible points. Any assignment submitted after Monday, February 6, will be an automatic zero.



- 
- 1.) Find all solutions to the equation below by hand. [ 7 Points ]  
(You cannot have a calculator solve it for you.)

$$|x - |5x + 1| + |2x + 3|| + |3x - 4| = |12x + 5|$$

- 2.) Find all solutions to the equation below by hand. [ 7 Points ]  
(You cannot have a calculator solve it for you.)

$$\left| \frac{\sqrt{27}x}{5} - \frac{7}{6} \right| + \frac{9}{2} = \left| \frac{5}{12} - \frac{\sqrt{363}x}{10} \right|$$

- 3.) Find all solutions to the equation below by hand. [ 7 Points ]  
(You cannot have a calculator solve it for you.)

$$|x^2 + x - 6| = |x^2 - 3x - 4| + 2$$

- 4.) See the attached function  $y = f(x)$  in **Figure 1**. Specifically state what transformations need to be performed to  $y = f(x)$  in order to graph the function  $y = -f\left(1 - \frac{x}{3}\right) + 2$ . Then, sketch the graph of the new function on the same grid. [ 6 Points ]

- 5.) For **Figure 2**, do what is requested where the questions are stated. [ 9 Points ]  
(Please do not do this problem on separate paper.)

- 6.) Given that the point  $\left(-\frac{3}{7}, \frac{2}{3}\right)$  is on the graph of  $y = f(x)$ , [ 6 Points ]

what point must fall on the graph of the function  $y = -\frac{9}{4}f\left(\frac{2x-5}{8x+1} + 1\right) + 2$  ?

- 7.) Draw any function with the following properties: [ 5 Points ]  
 Domain:  $[-2, 4) \cup \{5\}$   
 Range:  $\{-2, 8\} \cup [-1, 7]$
- 8.) Given  $\triangle ABC$  with  $A(1, 2)$ ,  $B(2, 4)$ ,  $C(5, 2)$ , find the following: [ 9 Points ]  
 A.) Coordinates of Circumcenter (where perpendicular bisectors intersect)  
 B.) Coordinates of Orthocenter (where altitudes intersect)  
 C.) Coordinates of Centroid (where medians intersect)  
 Also, show that all of its perpendicular bisectors intersect at the circumcenter,  
 all of its altitudes intersect at the orthocenter, and all of its medians intersect at the centroid.
- 9.) Find the equation of the parabola having focal point [ 4 Points ]  
 $\left(\frac{4}{5}, \frac{15}{7}\right)$  and directrix  $y = \frac{1}{7}$ .
- 10.) Find the center point and radius of the circle [ 4 Points ]  
 $16x^2 + 16y^2 + 64x + 65 = 8y + 100$ .
- 11.) Graph the following, solving for (and labeling) all of its key features [ 10 Points ]  
 $36x^2 + 288x + 25y^2 - 50y = 299$ .
- 12.) Derive the equation of the ellipse with focal points  $(-2, 0)$  and  $(6, 0)$  [ 5 Points ]  
 that has a constant sum of 10. You must do the full derivation  
 (with distance formula) for full credit!
- 13.) Find the system of inequalities needed to form the region in **Figure 3**. [ 4 Points ]
- 14.) In **Figure 4**, SQRE is a square of side length  $a$  and  $\triangle SMQ$  is equilateral. [ 2 Points ]  
 Find the area of  $\triangle QCR$  in exact form  
 (simplified square roots and fractions, where applicable).

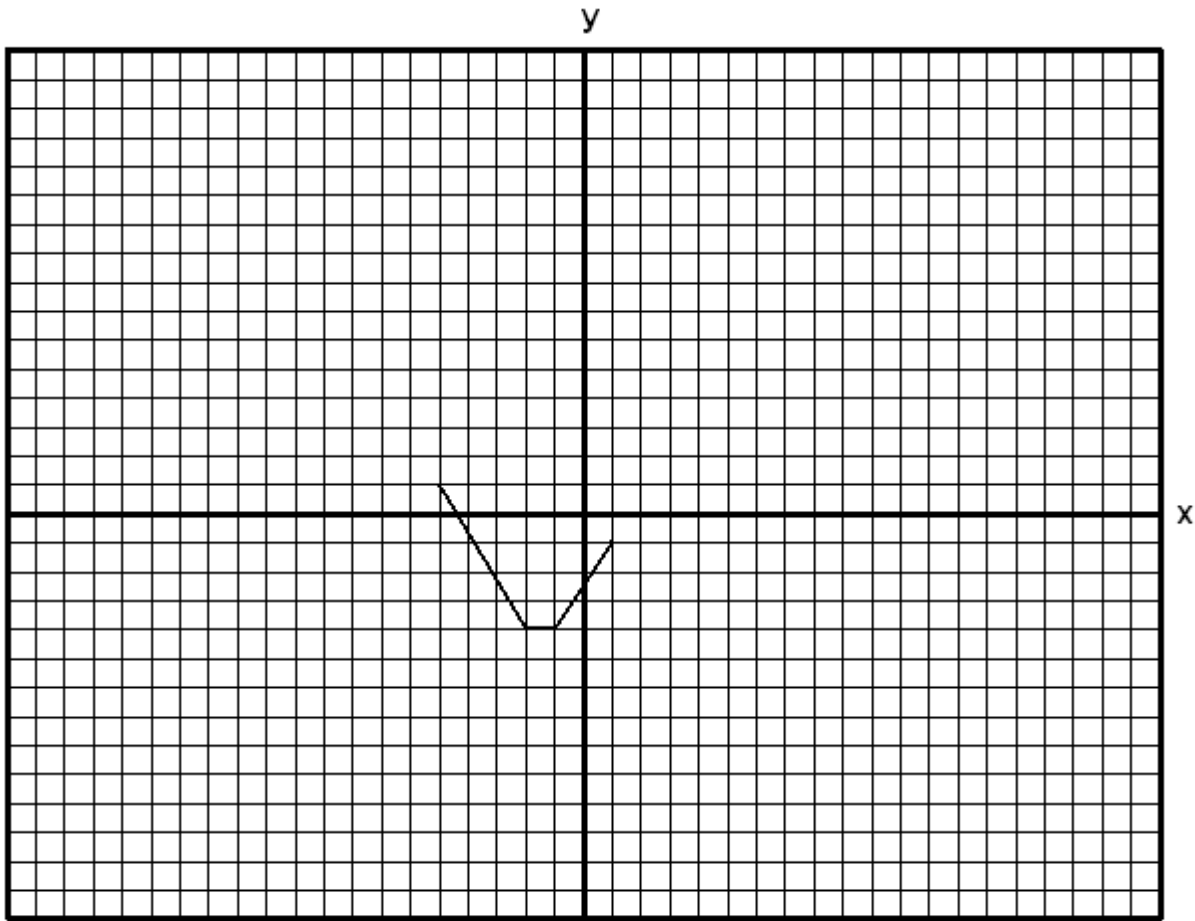


Figure 1

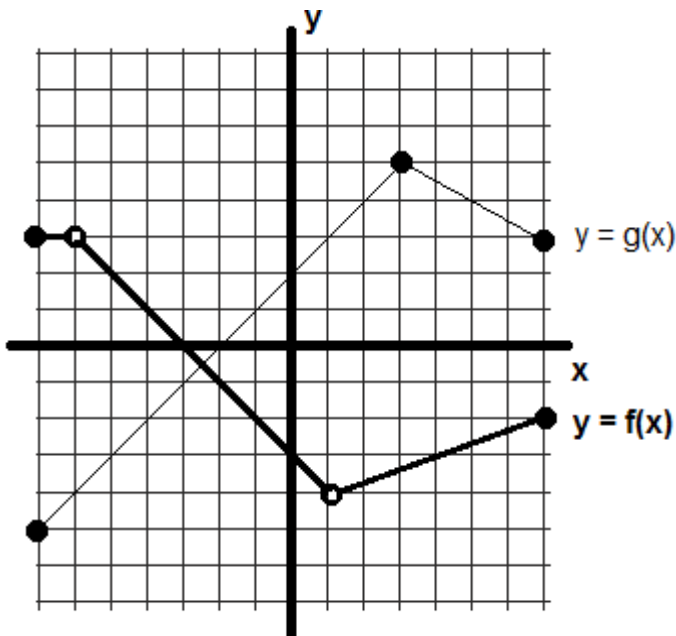


Figure 2

Domain of  $f(x)$ :

Range of  $f(x)$ :

Domain of  $g(x)$ :

Range of  $g(x)$ :

Show the steps used to arrive at your answer.

$(f \circ g)(2) =$

$(g \circ f)(7) =$

$(f \circ g)(-6) =$

$(g \circ f)(-1) =$

$f(x) = 1 \quad x = ?$

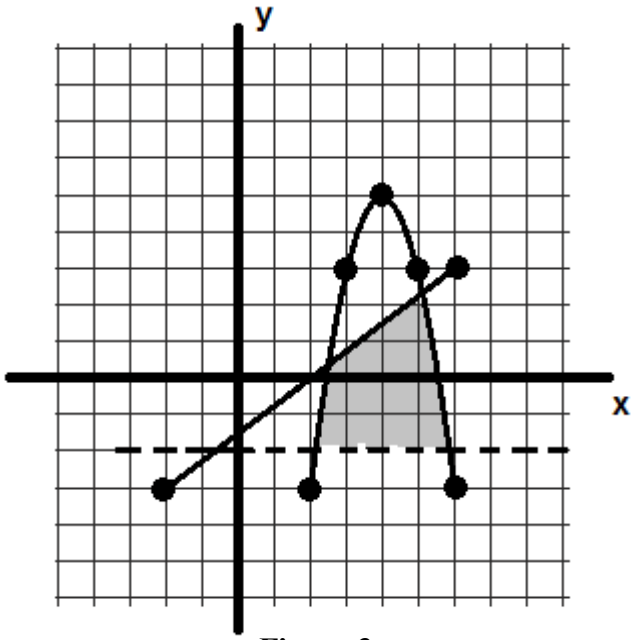


Figure 3

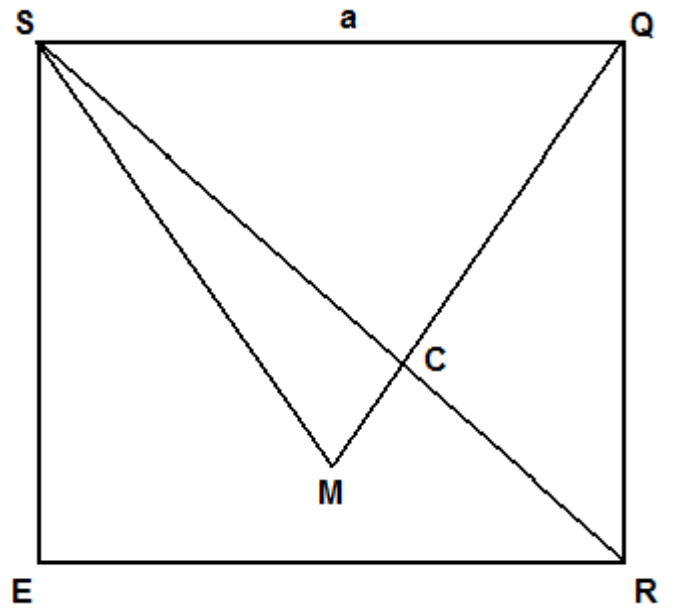


Figure 4