Remember that the important part of all these problems is the explanation of your answer, not your answer itself. You will not receive anywhere near full credit for a correct answer unless you explain why your answer is correct.

1. On the graph paper provided, carefully draw the figure that the given “R” is sent to when \( \mathbb{R}^2 \) is reflected across the \( x \) axis. Do the same for a reflection across the \( y \) axis. (Be sure to label which is which.)

2. On the graph paper provided, carefully draw the figure that the given “R” is sent to when \( \mathbb{R}^2 \) is rotated about the origin by \( 90^\circ \) counterclockwise. Do the same for a rotation about the point \((1,2)\) by \( 45^\circ \) clockwise. (Again be sure to label which is which.)

3. Let \( T_1, T_2 : \mathbb{R}^2 \to \mathbb{R}^2 \) be translations by arbitrary directed line segments \( \vec{s}_1, \vec{s}_2 \) in \( \mathbb{R}^2 \).
   
   (a) What function is \( T_2T_1 \)? (You should be able to express this as a single familiar function, rather than the composition of two functions.)
   
   (b) What function is \( T_1T_2 \)? (You should be able to express this as a single familiar function, rather than the composition of two functions.)

4. Let \( F_1, F_2 : \mathbb{R}^2 \to \mathbb{R}^2 \) be reflections across arbitrary lines \( L_1, L_2 \) in \( \mathbb{R}^2 \).
   
   (a) What function is \( F_2F_1 \)? (You should be able to express this as a single familiar function, rather than the composition of two functions.)
   
   (b) What function is \( F_1F_2 \)? (You should be able to express this as a single familiar function, rather than the composition of two functions.)

5. Let \( F : \mathbb{R}^2 \to \mathbb{R}^2 \) be the reflection across an arbitrary line \( L \) in \( \mathbb{R}^2 \), and let \( T : \mathbb{R}^2 \to \mathbb{R}^2 \) be translation by an arbitrary directed line segment \( \vec{s} \) in \( \mathbb{R}^2 \).
   
   (a) What function is \( TF \)? (You should be able to express this as a single familiar function, rather than the composition of two functions.)
   
   (b) What function is \( FT \)? (You should be able to express this as a single familiar function, rather than the composition of two functions.)