I. Circle TRUE or FALSE. Correct each false statement for 1pt of extra credit.

1. (2pts) If $A'B'$ is the result of an isometric transformation of $AB$, then, $AB = A'B'$.  
   
   TRUE   FALSE

2. (2pts) Translation is a transformation of the plane that moves every point in the plane a specified distance in a specified direction.  
   
   TRUE   FALSE

3. (2pts) On the coordinate plane, the transformation $(x, y) \rightarrow (y, x)$ is a rotation of 90 degrees about the origin.  
   
   TRUE   FALSE

4. (2pts) On the coordinate plane, if one non-vertical line is perpendicular to another non-vertical line, then the product of the slopes of the two lines is one.  
   
   TRUE   FALSE

5. (2pts) Reflection is a transformation of the plane that fixes every point on the line of reflection and sends every point $P$ not on the line of reflection to a point $P'$ such that the $PP'$ is perpendicularly bisected by the line of reflection.  
   
   TRUE   FALSE
6. (2pts) Translation is the only isometric transformation of the plane in which a segment and the segment’s image are always parallel.  
   TRUE  FALSE

7. (2pts) If one polygon is the dilated image of another polygon, then the two polygons are always congruent.  
   TRUE  FALSE

8. (2pts) If a segment is dilated with scale factor \( r > 0 \), then its image is always a segment that is parallel to the pre-image and \( r \) times as long as the pre-image.  
   TRUE  FALSE

9. (2pts) Two figures are always congruent if one is the image of the other by a sequence of isometric transformations followed by a dilation.  
   TRUE  FALSE

10. (2pts) Any rectangle can be used to develop an example of a regular tessellation of the plane.  
    TRUE  FALSE
II. Provide answers in the spaces provided.

11. (8pts) Find the image of \( \triangle ABC \) under the following transformations:

(a) A rotation about the origin by 180°

(b) \((x, y) \rightarrow (x + 3, y - 5)\)

12. (8pts) Find the image of \( \triangle ABC \) under the following transformations:

(a) A reflection in the \( y \)-axis

(b) A reflection in the line \( y = x \)
13. (8pts) The following figure shows a dilation of \( \triangle ABC \). Find the center of dilation and the scale factor of the dilation.

![Dilation of \( \triangle ABC \)](image)

14. Indicate which of the following figures will always tessellate the plane.

a) (2pts) Isosceles Trapezoid  
   Tessellates  
   Does Not Tessellate

b) (2pts) Circle  
   Tessellates  
   Does Not Tessellate

c) (2pts) Rhombus  
   Tessellates  
   Does Not Tessellate

d) (2pts) Regular Hexagon  
   Tessellates  
   Does Not Tessellate
III. Show all your work. Provide Justification. Clearly explain your reasoning.

15. (8pts) Describe a sequence of isometries to demonstrate that the two triangles are congruent.

16. (8pts) The preimage and image resulting from a single isometric transformation are shown below. Identify the transformation. Identify all the hidden elements associated with the transformation and name them appropriately.
17. (8pts) Show how to represent the letter “T” drawn below in perspective using the indicated vanishing point and a scale factor of $\frac{1}{2}$. Identify which mathematical transformation enables artwork to gain perspective.

18. (8pts) Prove that a regular pentagon cannot be used to create a regular tessellation of the plane.