Answer all the questions, justify your answers and show your work.

1. Prove two of the following propositions:
   A) The area of the region in Figure (a) is $\pi - \delta - \epsilon$
   B) Any arc of a Euclidean semicircle that is centered on the $x$-axis is a hyperbolic geodesic.
   C) The area of a spherical triangle is $\alpha + \beta + \gamma - \pi$.

2. The points $A(0,0), B(4,4), C(0,6)$ are given.
   a) Compute the (hyperbolic) lengths of the sides of the hyperbolic $\triangle ABC$.
   b) Compute the (hyperbolic) measures of the angles of the hyperbolic $\triangle ABC$.
   c) Compute the (hyperbolic) area of the hyperbolic $\triangle ABC$.

3. Explain why the function
   \[ f(z) = -\frac{1}{z} \]
   is a $180^\circ$ rotation of the hyperbolic plane. Find its center.

4. The solid in Figure (b) is truncated by bisecting each edge. How many vertices, edges, and faces does the resulting solid have?

5. Draw the flow diagrams of the following hyperbolic rigid motions.
   a) $\frac{3z-1}{z+1}$  
   b) $3z + 12$  
   c) $\frac{4z-3}{z}$

6. Identify the Euclidean rigid motion
   \[ R_{(6,0),60^\circ} \circ R_{(5,0),60^\circ} \circ R_{(4,0),60^\circ} \circ R_{(3,0),60^\circ} \circ R_{(2,0),60^\circ} \circ R_{(1,0),60^\circ}. \]

7. Identify the following compositions of Euclidean rigid motions relative to the square $ABCD$ in Figure (c).
   a) $\gamma_{AB} \circ R_{A,180^\circ}$  
   b) $\gamma_{AB} \circ \rho_{CD}$. 