Name: _____

1. (4 points) Show that $SL_2(\mathbf{Z})$ is a discrete subgroup of $SL_2(\mathbf{R})$. That is, for each $g = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in$ $SL_2(\mathbf{Z})$, find an open neighborhood $U(g)$ in $SL_2(\mathbf{R})$ such that $U(g) \cap U(g') = \emptyset$ unless $g = g'$.

2. (4 points) Find the hyperbolic area of the region

$$R = \{x + iy : 0 \le x \le 1, 1 \le y \le 2\}.$$

Can you find the area of R using the Gauss-Bonnet theorem?