

## Poincaré disk continued

### 1. WINDING UP

#### 1.1. Limiting parallel axiom.

### 2. UPPER HALF PLANE

#### 2.1. Points and lines.

#### 2.2. Möbius transformation sending Poincaré disk to the Upper Half plane. Cayley transform : $z \mapsto i\frac{z-1}{z+1}$ takes Poincaré disk to the upper half plane.

### Möbius transformations on the Riemann sphere

### 3. PROPERTIES

#### 3.1. Circles are taken to circles.

#### 3.2. Conformality.

#### 3.3. Fenn's cross ratio is preserved.

#### 3.4. Real cross ratio theorem.

### 4. MÖBIUS TRANSFORMATIONS

#### 4.1. $SU(1, 1; \mathbb{C})$ and $SL(2, \mathbb{R})$ .

#### 4.2. Orientation reversing Möbius transformations.

### 5. SOME COMMENTS ON MODULAR FORMS