# Riemann Surfaces
# Lecture 7

Today we add some geometry to the mix.

**Definition** tangent spaces, tangent bundles, and vector fields; cotangent bundles and 1-forms

**Definition** Riemannian inner products

**Definition** Riemannian metrics

**Definition** Euclidean metrics

**Definition 2.3.1** conformal Riemannian metrics

**Remarks**

**Definition** complete metrics

**Definition 2.3.2** metric potential

**Lemma 2.3.1**

**Definition 2.3.3** Laplace-Beltrami operator

**Definition 2.3.4** curvature

**Definition 2.3.5** isometries

We now state without proof (it's in the book on page 22),
**Lemma 2.3.2**

**Example** The Euclidean metric is flat.

**Lemma 2.3.3**

**Sketch of proof**

**Example** the disk and upper half plane

**Definition 2.3.6** Möbius transformations

Again, we state without proof. (Read the proofs!)

**Theorem 2.3.2**

**Theorem 2.3.3**