McMullen@Colloq: Billiards and curves in moduli space

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Problem Compute $\int \frac{dx}{Q(x)^{1/d}}$ Q: Polynomial.

$$\text{In[1]:=} \int \frac{1}{\sqrt[3]{1-x^3}}\,dx$$

$$\text{Out[1]=} \frac{1}{2\left(1-x^3\right)^{1/3}}\, 3 \left(1+\frac{-1+x}{1+(-1)^{1/3}}\right)^{1/3} \left(1+\frac{-1+x}{1-(-1)^{2/3}}\right)^{1/3} (-1+x)\ \text{AppellF1}\left[\frac{2}{3}, \frac{1}{3}, \frac{1}{3}, \frac{5}{3}, -\frac{-1+x}{1-(-1)^{2/3}}, -\frac{-1+x}{1+(-1)^{1/3}}\right]$$

"Teichmuller space is completely the opposite of homogeneous".

Every X in M_g can be built by gluing the edges of a polygon in $\mathbb{C}$ by translation. $g > 1$

$dz \rightsquigarrow$ actually get a surface w/ a holomorphic 1-form.

The bundle $\begin{matrix}(\text{1-forms})\\ \downarrow \\ \text{surfaces}\end{matrix}$ carries an action of $SL_2(\mathbb{R})$