In[179]:=

```
MobiusTransform[∞, β_, γ_] :=
  ({{0, (β - γ)}, {1, -γ}}) / Sqrt[Det[{{0, (β - γ)}, {1, -γ}}]];
MobiusTransform[α_, β_, γ_] := ({{(β - γ) / (β - α), -α (β - γ) / (β - α)}, {1, -γ}}) /
  Sqrt[Det[{{(β - γ) / (β - α), -α (β - γ) / (β - α)}, {1, -γ}}]]
```

In[175]:=

```
ω = Exp[2 π ⅈ / 3];
X =
 FullSimplify[Inverse[MobiusTransform[Conjugate[ω], ω, 0]].MobiusTransform[∞, ω, 1]]
Y = FullSimplify[
  Inverse[MobiusTransform[1, Conjugate[ω], 0].MobiusTransform[∞, Conjugate[ω], ω]]]
Z =
 FullSimplify[Inverse[MobiusTransform[1, ω, 0]].MobiusTransform[∞, Conjugate[ω], 1]]
```

Out[176]=

$$\left\{\left\{\frac{1}{6}\left(3-i\sqrt{3}\right),\frac{1}{6}i\left(3i+\sqrt{3}\right)\right\},\left\{\frac{i}{\sqrt{3}},\frac{1}{6}\left(9+i\sqrt{3}\right)\right\}\right\}$$

Out[177]=

$$\left\{\left\{-(-1)^{1/6}\sqrt{3},\frac{1}{6}\left(3+i\sqrt{3}\right)\right\},\left\{0,-\frac{1}{1+(-1)^{1/3}}\right\}\right\}$$

Out[178]=

$$\left\{\left\{\frac{1}{1+(-1)^{1/3}},-\frac{1}{1+(-1)^{1/3}}\right\},\left\{\frac{1}{1+(-1)^{1/3}},1+\frac{2i}{\sqrt{3}}\right\}\right\}$$

In[171]:=

```
Simplify@Tr[X]
Simplify@Tr[Y]
Simplify@Tr[Z]
Simplify@Tr[Z.Y.Z.Z.Y.Z]
```

Out[171]=

$$2$$

Out[172]=

$$\frac{5i-3\sqrt{3}}{-3i+\sqrt{3}}$$

Out[173]=

$$1+\frac{2i}{\sqrt{3}}+\frac{1}{1+(-1)^{1/3}}$$

Out[174]=

$$-\frac{10}{3}$$