In[79]:=
$$\frac{\partial \vartheta_2(0, q)}{\partial q}$$

Out[79]=
$$\text{EllipticTheta}^{(0,0,1)}(2, 0, q)$$

In[80]:=
$$\text{FindRoot}[\%, \{q, .3\,i\}, \text{WorkingPrecision} \to 33]$$

Out[80]=
$$\{q \to 6.9998622697803488409940932890 2129 \times 10^{-45} + 0.3281065668749101872250212309937 05\,i\}$$

In[81]:=
$$\text{Im}(q /. \%)$$

Out[81]=
$$0.32810656687491018722502123099370 5$$

In[82]:=
$$\text{ParametricPlot}[\{\vartheta_2(t, \%), \vartheta_1(t, \%)\}, \{t, 0, 2\pi\}]$$

Out[82]=