Lateral force on hanging chain

Consider a chain of $N$ links in the form of uniform rods of mass $m$ and length $2l$ each, connected by frictionless hinges. At one end the chain is attached to a stationary pivot. The other end is pulled sideways by a constant force $F$. The links are numbered $N$ through 1 from the pivot outwards. Find the angle $\theta_n$ between link $n$ and the horizontal for $n = 1, 2, \ldots, N$ at equilibrium.

Solution: