Alpha Helix – Rotation Angle
Formula Breakdown

Original Formula

$$3 * \cos(\text{Rotation Angle}) = 1 - 4 * \left[\cos\left[\frac{\text{Dihedral Angle \#1} + \text{Dihedral Angle \#2}}{2}\right]\right]^2$$

Modified Formula for the Python Program

$$\text{Rotation Angle} = \arccos\left[\frac{1 - 4 * \left[\cos\left[\frac{\text{Dihedral Angle \#1} + \text{Dihedral Angle \#2}}{2}\right]\right]^2}{3}\right]$$

$$\text{Rotation Angle} = \arccos\left[\frac{1 - 4 * \left[\cos\left[\boxed{\text{AngleOnePlusAngleTwoOverTwo}}\right]\right]^2}{3}\right]$$

Convert to radians so that math.cos(*x*) can calculate it!

$$\text{TopInRadians} = \text{math.radians}\left[\boxed{\text{AngleOnePlusAngleTwoOverTwo}}\right]$$

$$\text{Rotation Angle} = \arccos\left[\frac{1 - 4 * \left[\cos\boxed{\text{TopInRadians}}\right]^2}{3}\right]$$

$$\text{Rotation Angle} = \arccos\left[\frac{1 - \left[4 * \boxed{\text{CosineOfTop}}\right]^2}{3}\right]$$

$$\text{Rotation Angle} = \arccos\left[\frac{1 - \left[4 * \boxed{\text{CosineOfTopSquared}}\right]}{3}\right]$$

$$\text{Rotation Angle} = \arccos\left[\frac{1 - \left[\boxed{\text{FourTimesCosineSquared}}\right]}{3}\right]$$

$$\text{Rotation Angle} = \arccos\left[\frac{\boxed{\text{OneMinusFourTimesCosineSquared}}}{3}\right]$$

$$\text{Rotation Angle} = \arccos\left[\boxed{\text{DividedBy3}}\right]$$

$$\text{ArccosInRadians} = \operatorname{acos}\left[\boxed{\text{DividedBy3}}\right]$$

$$\text{Rotation Angle} = \left[\text{math.degrees(ArccosInRadians)}\right]$$