A golf ball is hit at an angle $α$ with the horizontal and moves under gravity with air resistance $κv$ per unit mass, where $v$ is the velocity and $κ>0$ is a constant. Show that the equation of the path can be written as
$$z=x\left(\tan(α)+\frac{g}{κu}\right)+\frac{g}{κ^{2}}log\left(1-\frac{κx}{u}\right),$$

where$ u$ is the initial horizontal component of $v$. If $κ$ is small enough for $κ^{2}$ to be neglected, show that the air resistance reduces the range of the golf ball on the horizontal plane by
$$\frac{8κu^{3}tan^{2}α}{3g^{2}}.$$