1. **Describe a real research scenario where decision trees would be more effective than linear models.**

2. **Consider the case where you want to model how income ($X_{income}$, in dollars per year) and social isolation index ($X_{SI}$, continuous scale from 0 to 1) predict a continuous measure of stress (Y). Interpret, in colloquial terms, the results of the following two models:**
    a. **Using a decision tree to model the relationship Y ~ $X_{income}$ + $X_{SI}$ you can reliably predict Y, in a hold out test set, using a tree with three regions (R1: $X_{income}$>$75,000; R2: $X_{income}$ < $75,000 & $X_{SI}$ >=0.75; R3:$X_{income}$ < $75,000 & $X_{SI}$ < 0.75).**
    b. **Using linear regression Y ~ $\widehat{\beta}_{income}$ $X_{income}$ + $\widehat{\beta}_{SI}$ $X_{SI}$ + $\widehat{\beta}_{intx}$ $X_{income}$*$X_{SI}$ you can reliably predict Y, in a hold out test set, with $\widehat{\beta}_{income} = -0.01$ , $\widehat{\beta}_{SI} = +0.25$ , and $\widehat{\beta}_{intx} = -0.05$ .**