1. The average daily temperature in Fairbanks has the following properties:

- The average temperature for the year is $25°F$
- The maximum average daily temperature is $62°F$, and this occurs on July 11 (day 192 of the year).

a) Assuming that there are 365 days in the year, find numbers A, ω, d, and τ such that

$$T(t) = A\sin(\omega(t-d)) + \tau$$

is a good model for the average daily temperature in Fairbanks. Here t is measured in days from the start of the year (i.e. the end of February 10 corresponds to $t = 41$.)

b) Using software of your choice, plot the graph of your function $T(t)$. Add the line corresponding to $T = 25°F$. Verify that the temperatures on January 1 and December 31 are very close. Verify that the maximum temperature is the right value on the right day.

c) On what day of the year are temperatures cooling fastest?

d) How fast are the average temperatures falling on that day?

2. Find the linearization of $f(x) = \sqrt[3]{x}$ at $x = 8$. Sketch the graph of $L(x)$ and $f(x)$ and label the points $f(8)$, $L(8)$, $f(8.5)$, and $L(8.5)$. Use the linearization to estimate $f(8.5)$.

3. Find a suitable linearization of $f(x) = (1+x)^{50}$ to estimate $(1.0002)^{50}$.