9. [14 points]
   a. [7 points] A mass is attached to the top of a ceiling by a spring. The height of the mass above the ground oscillates from a minimum of 1.2 meters to a maximum of 2.5 meters. Let \( f(t) \) be the height of the mass above the ground, in meters, at time \( t \) measured in seconds. Some of the values of the function \( f(t) \) are shown below

   \[
   \begin{array}{c|cccc}
   t & 0 & 1 & 2 & 3 & 4 \\
   \hline
   f(t) & 1.65 & 2.38 & 2.38 & 1.65 & 1.2 \\
   \end{array}
   \]

   Note: All the values in the table are rounded to the nearest 0.01.

   Suppose \( f(t) \) is a sinusoidal function.

   i) Find the period, amplitude and midline of \( y = f(t) \).

   \[ \textbf{Solution}: \] Period = 5  Amplitude = 0.65  Midline: \( y = 1.85 \)

   ii) Find a formula for \( f(t) \).

   \[ f(t) = 1.85 + 0.65 \cos \left( \frac{2\pi}{5} (t - 1.5) \right) \]

   b. [7 points] Find all solutions to \( 4 - 5 \sin \left( \frac{\pi}{2} x - \frac{\pi}{6} \right) = 2 \) for \( 0 \leq x \leq 5 \). Your answers must be found algebraically and in exact form.

   \[ \textbf{Solution}: \]

   \[
   \begin{align*}
   4 - 5 \sin \left( \frac{\pi}{2} x - \frac{\pi}{6} \right) & = 2 \\
   5 \sin \left( \frac{\pi}{2} x - \frac{\pi}{6} \right) & = -2 \\
   \sin \left( \frac{\pi}{2} x - \frac{\pi}{6} \right) & = 0.4 \\
   \frac{\pi}{2} x - \frac{\pi}{6} & = \sin^{-1}(0.4) \\
   \frac{\pi}{2} x & = \sin^{-1}(0.4) + \frac{\pi}{6} \\
   x & = \frac{2}{\pi} \left( \sin^{-1}(0.4) + \frac{\pi}{6} \right) = \frac{2}{\pi} \sin^{-1}(0.4) + \frac{1}{3} \\
   \end{align*}
   \]

   \[
   \begin{align*}
   x_1 & = \frac{2}{\pi} \sin^{-1}(0.4) + \frac{1}{3} \\
   x_2 & = \frac{7}{3} - \frac{2}{\pi} \sin^{-1}(0.4) \\
   x_3 & = x_1 + 4 \\
   \end{align*}
   \]