5. [11 points] The water levels in a large bay fluctuate due to the tides. High tide, which is when water levels are at their maximum, happens roughly twice per day. Similarly, low tide is when water levels are at their minimum.

  a. [6 points] At one particular location in this bay, the depth, in feet, of the water t hours after midnight on December 1 was given by

$$D(t) = 11\cos\left(\frac{24\pi}{149}(t-3)\right) + 56.$$

   i. What is the depth of the water, in feet, at this location at high tide? At low tide?

$\underline{\hspace{4cm}}$ feet at high tide

$\underline{\hspace{4cm}}$ feet at low tide

   ii. Find the period of $D(t)$, either in exact form or rounded to two decimal places. Then interpret what it means in the context of this problem.

Period: $\underline{\hspace{4cm}}$

Meaning:

   iii. Find the times t of all high tides that occur on December 1. *Give your answer as a list of t-values in exact form or rounded to two decimal places.*

$t = \underline{\hspace{6cm}}$

This problem continues on the next page.

b. [5 points] At another location in the bay, the depth, in feet, of the water t hours after midnight on December 1 was given by

$$P(t) = 9\sin\left(\frac{24\pi}{149}t\right) + 40.$$

Find the t-values of all times on December 1 that the water level at this location was 45 feet. *Give your answer as a list of t-values in exact form or rounded to two decimal places.*

$t =$ _____