3. [12 points] The popularity of baby names varies over time; the names that are popular one year may not be popular at all within a few years. The popularity of baby names beginning with the letter $I$ appears to be periodic. In 1885, approximately 16,000 per million babies born had first names beginning with the letter $I$. Their popularity began decreasing at that time and decreased until 1945, when the number had dropped to a low of 2,200 per million. In 2005 it was back to 16,000 per million babies born.

Let $B(t)$ denote the popularity of names beginning with the letter $I$, in thousands of babies per million babies born, $t$ years after 1885. Assume that $B(t)$ is a sinusoidal function.

a. [6 points] Sketch the graph of $B(t)$. (Remember to clearly label your graph.)

b. [6 points] Find a formula for $B(t)$. 