

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  $B(t)$ .