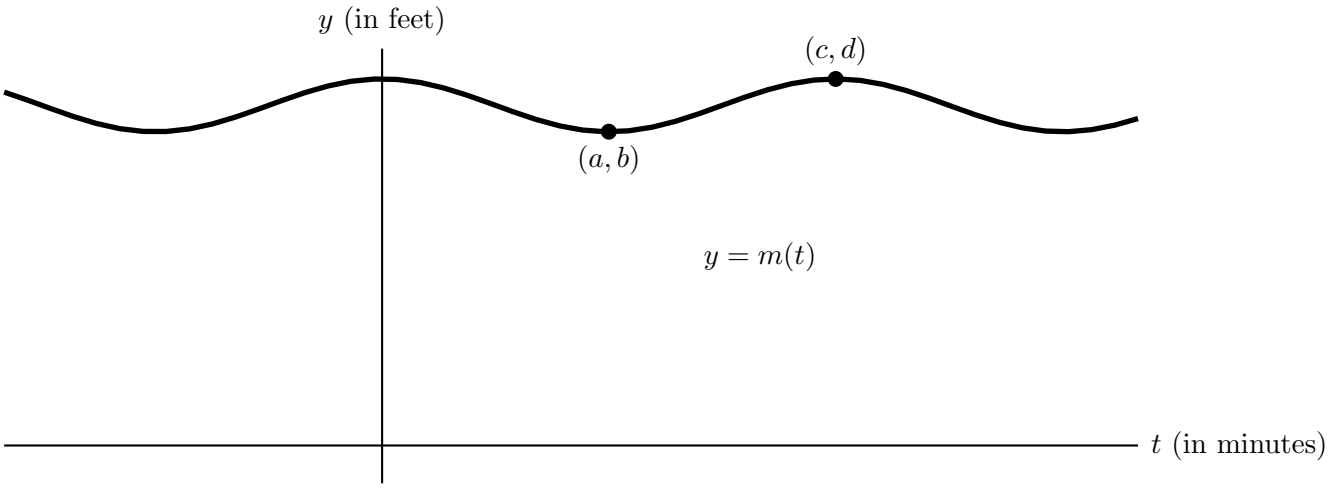
4. [7 points] Big Ben is the third-largest free standing clock tower in the world. It has a clock on each of its four sides. The center of each clock face is 180 feet above the ground, and the minute hand of each clock is 14 feet long. Let $m(t)$ be the height above ground, measured in feet, of the tip of a minute hand t minutes after midnight.
A portion of the graph of $y = m(t)$ is shown below.



a. Use the information provided in the description above to find the values of the constants a, b, c, and d shown in the graph.

$a =$ 30 $b =$ 166 $c =$ 60 $d =$ 194

b. Find the period, amplitude, and midline of the graph of $y = m(t)$ and find a formula for $m(t)$. (*Include units for the period and amplitude.*)

period: 60 **minutes**

amplitude: 14 **feet**

midline: $y =$ 180

formula: $m(t) = 14\cos\left(\frac{2\pi}{60}t\right) + 180$