4. [10 points] Before the industrial era, the carbon dioxide (CO$_2$) level in the air in Ann Arbor was relatively stable with small seasonal fluctuations caused by plants absorbing CO$_2$ and producing oxygen in its place. Typically, on March 1, the CO$_2$ concentration reached a high of 270 parts per million (ppm), and on September 1, the concentration was at a low of 262 ppm. Let $G(t)$ be the CO$_2$ level $t$ months after January 1.

a. [5 points] Assuming that $G(t)$ is periodic and sinusoidal, sketch a neat, well-labeled graph of $G$ with $t = 0$ corresponding to January 1.

\[ G \]

\[ t \]

b. [5 points] Determine an explicit expression for $G$, corresponding to your sinusoidal graph above.