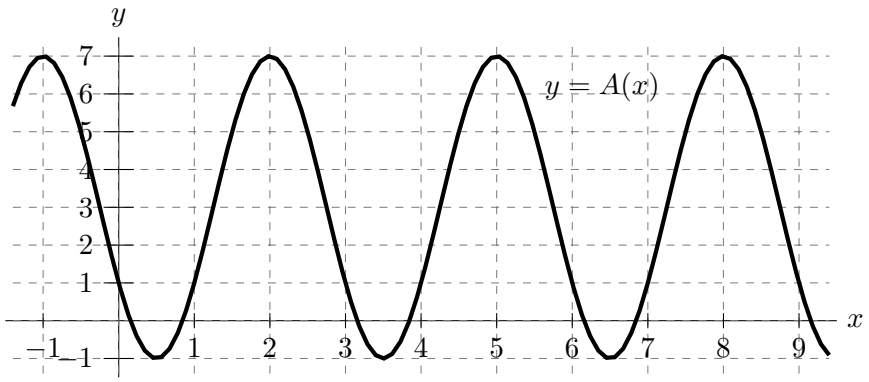
**8**. [4 points] Let $A(x)$ be a sinusoidal function, a portion of which is shown in the graph below.




Write a formula for $A(x)$.

**Answer:** $A(x) =$ _____

**9**. [7 points] Consider the function $f(x)$ defined by

$$f(x) = \begin{cases} xe^{Ax} + B & \text{if } x < 3 \\ C(x-3)^2 & \text{if } 3 \le x \le 5 \\ \dfrac{130}{x} & \text{if } x > 5. \end{cases}$$

Suppose $f(x)$ satisfies all of the following:

- $f(x)$ is continuous at $x = 3$.
- $\lim\limits_{x \to 5^+} f(x) = 2 + \lim\limits_{x \to 5^-} f(x)$.
- $\lim\limits_{x \to -\infty} f(x) = -4$.

Find the values of $A, B$, and $C$.
*Show your work. You must give exact answers. Do not use decimal approximations. For example,* 0.333333333 *would* <u>not</u> *be an acceptable answer if the answer were* $\frac{1}{3}$.

**Answer:** $A =$ _____, $B =$ _____, and $C =$ _____