1. A researcher has been studying the breeding habits of various spiders in her area. She finds that the average female brown recluse has produced a total of \( B(t) \) eggs after it has been alive for \( t \) months. While it won’t help with this problem, you should assume that spiders never sleep and that they do not know fear.

(a) (2pt) A different type of spider produces eggs at the same pace as the brown recluse but waits one month longer than the brown recluse to start producing eggs. (For example, when this spider has been alive for 6 months it has produced the same number of eggs that the brown recluse produces in 5 months.) Define \( E \) such that this spider has produced \( E(t) \) eggs (on average) after it has been alive for \( t \) months. Write \( E \) as a transformation of \( B \).

(b) (2pt) The researcher would like to study the brown recluse’s breeding habits in years instead of months. Define \( \hat{B} \) such that the average female brown recluse has produced a total of \( \hat{B}(t) \) eggs after it has been alive for \( t \) years. Find a formula for \( \hat{B}(t) \).

2. (6pt) The function \( T \) is defined such that \( T(d) \) is the average temperature in a particular place on the \( d \)-th day of March, 2015.

- During July of 2015 the temperature was ten degrees warmer each day than it was on the same day in March of 2015. Let \( U(d) \) be the average temperature on the \( d \)-th day of July, 2015.
- During March of 2016 the temperature was 50 percent warmer each day than it was on the same day in March of 2015. Let \( V(d) \) be the average temperature on the \( d \)-th day of March, 2016. Note: This isn’t a very realistic model for March of 2016 but realistic models would have been considerably more difficult to graph.

The graph of \( y = T(d) \) is shown below. Write both \( U \) and \( V \) as a transformation of \( T \) and then sketch the graph of each. Two blank plots have been provide; use one for each function. (Note that all temperatures are in degrees Fahrenheit.)
3. Functions \( y = p(x) \) and \( y = f(x) \) are graphed below.

(a) (3pt) On the left graph (the one containing \( y = p(x) \)), sketch the graph of \( y = p(-x - 1) \).

(b) (3pt) Write \( f \) as a transformation of \( p \). That is, treat \( p \) as a parent function and use it as part of an equation for \( f(x) \).

4. (4pt) The graph of \( y = q(t) \) is shown below. Find an equation for \( q(t) \).