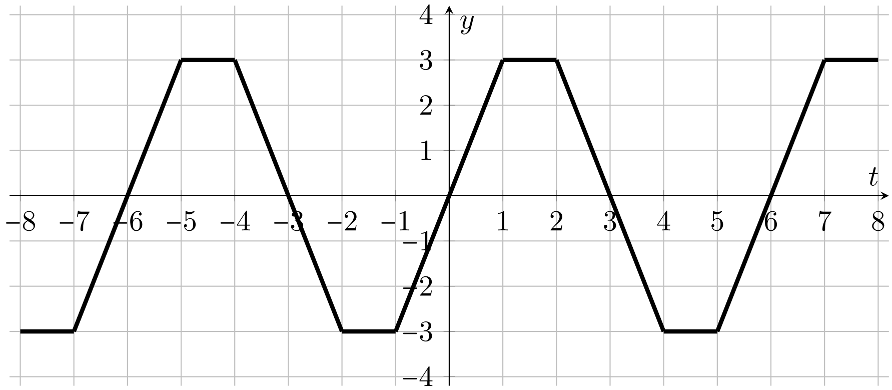
1. [12 points] Below is a graph of periodic, odd function $h(t)$, with period 6:



a. [3 points] A **new** function $g(t) = -h(2t)$ ...

- ... has period: **3**
- ... is (CIRCLE ONE) $\boxed{\textbf{ODD}}$ **EVEN** **NEITHER**
- ... has amplitude: **3**

Solution: Because $g(t)$ is a horizontal compression of $h(t)$ by a factor of $1/2$, its period will be half as large, so 3.

When we horizontally stretch $h(t)$ and reflect it over the t-axis, it still retains its symmetry about the origin, so is still odd. We could also see this algebraically, using the fact that $h(t)$ is odd:

$$g(-t) = -h(-2t) = -(-h(2t)) = -g(t)$$

The amplitude of $h(t)$ is unchanged by the transformations, so the amplitude of $g(t)$ is still 3.

b. [3 points] Another **new** function $w(t) = 3h(t-1)$ ...

- ... has period: **6**
- ... is (CIRCLE ONE) **ODD** **EVEN** $\boxed{\textbf{NEITHER}}$
- ... has maximum value: **9**

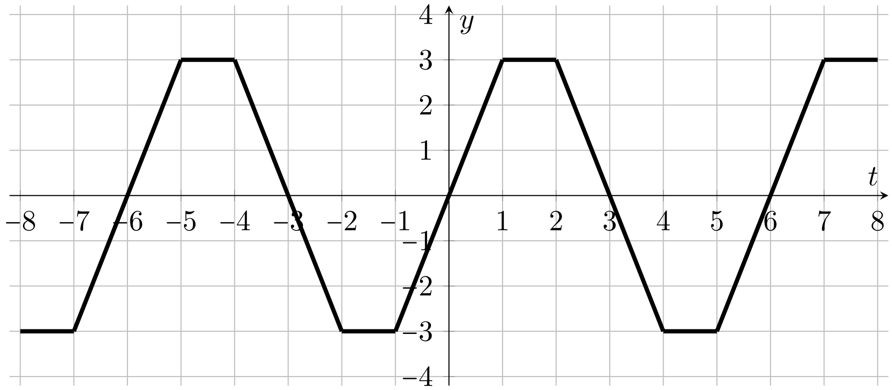
Solution: Because $w(t)$ has not been stretched or compressed horizontally, its period will remain the same: 6.

When we horizontally shift $h(t)$ right by 1, it loses its symmetry about the origin. It is neither odd nor even after that shift.

$w(t)$ is a vertical stretch of $h(t)$ by a factor of 3, so its amplitude is 3 times as large, so 9.

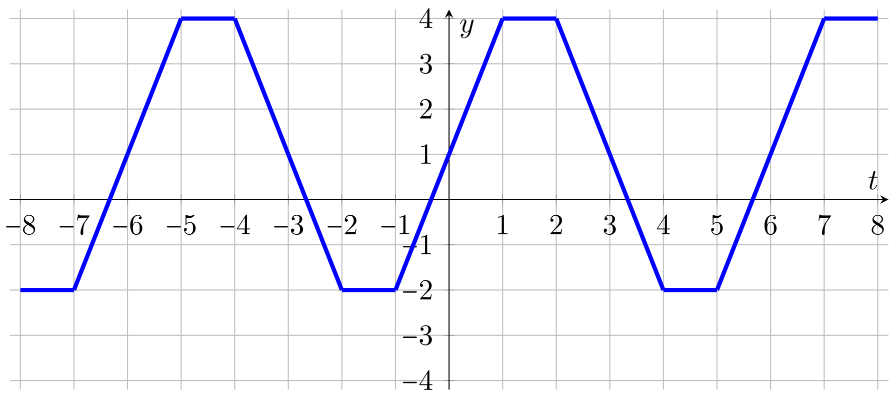
This problem continues on the next page.

The graph of $h(t)$ is reproduced here for your convenience.

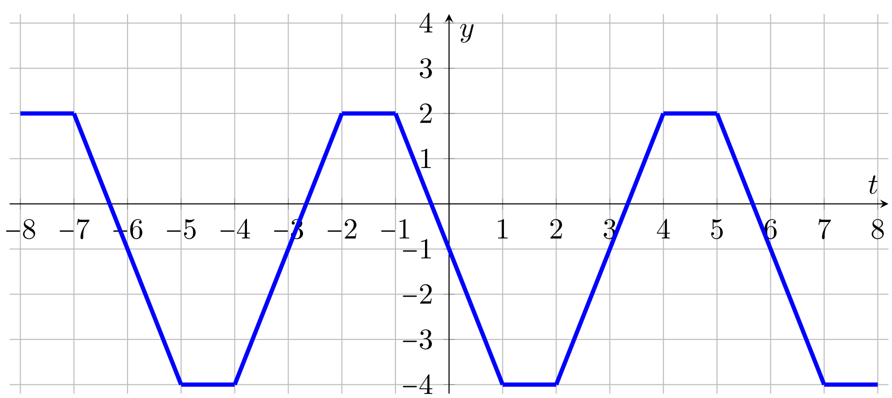


c. [6 points] Carry out the following sequence of transformations to the graph of $h(t)$. Draw each intermediate graph on the provided axes. *Clearly label at least three specific, known points in each graph.*

1. Shift the graph of $h(t)$ up by 1 unit.



2. Reflect the resulting graph over the t-axis.



Call the function in the final graph $k(t)$. What is a formula for $k(t)$ in terms of $h(t)$?

$k(t) =$ $-(h(t)+1)$ **or, equivalently,** $-h(t)-1$