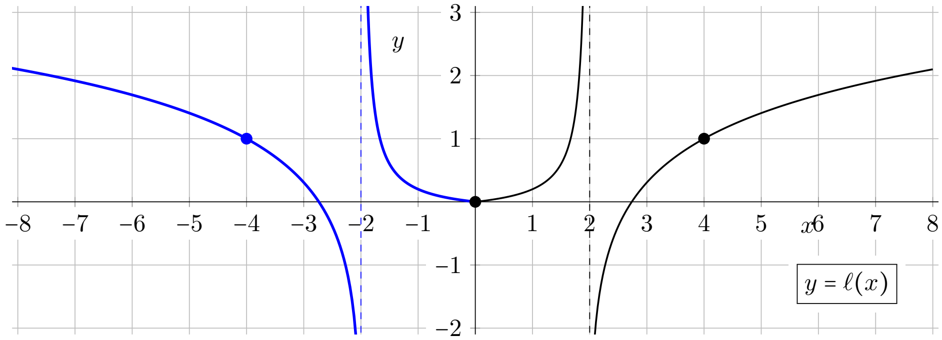
6. [10 points] Part of the graph of an **even** function $y = \ell(x)$ is shown below. Though the graph is only drawn for the interval $[0, 8)$, the domain of ℓ is all real numbers except those where it has a vertical asymptote.



a. [2 points] On the axes above, draw in the graph of $\ell(x)$ on the interval $(-8, 0)$.

b. [2 points] On the interval $(2, \infty)$, the function $\ell(x)$ is either a transformed exponential function or a transformed logarithm function. Circle which one, then briefly justify.

EXPONENTIAL $\qquad$ LOGARITHM

Justification:

Solution: Since this part of the graph has a vertical asymptote, it must be a transformed logarithm function, since they have vertical asymptotes and exponential functions do not.

c. [2 points] Consider the function $j(x) = \ell(2x) - 7$. Is $j(x)$ even, odd, or neither, or is there not enough information to tell? Circle your answer, then briefly justify.

EVEN $\qquad$ ODD $\qquad$ NEITHER $\qquad$ NOT ENOUGH INFO

Justification:

Solution: We have $j(-x) = \ell(-2x) - 7 = \ell(2x) + 7 = j(x)$ since $j(x)$ is even. Or, a horizontal compression and shift up do not change the symmetry over the y-axis.

d. [4 points] Consider the function $m(x) = -2\ell((x - 1))$. Carefully sketch the graph of $m(x)$ on the entire interval $(-1, 6)$. Make sure any **asymptotes** are clear, and mark the new locations of the **closed circles** in the original graph. Give your final answer on the axes to the **right**. The extra set of axes on the left may be used for scratchwork.