2. [11 points]
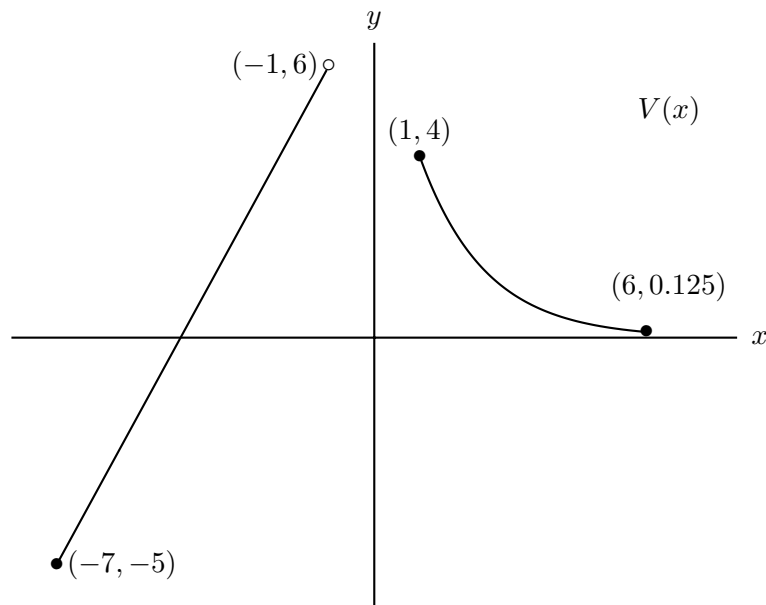
Let $V(x)$ be a function whose graph is pictured below. It has two pieces - one piece is a **linear** function and one is an **exponential** function. Do not assume anything about this function outside of the part shown in the graph below.

Write a piecewise-defined formula for $V(x)$. For this problem you will be graded both on the correctness of your formulas for each piece and on the use of piecewise notation. Circle your final answer for $V(x)$.

Solution: The linear part can be found using the two points given. The slope between them is $\frac{11}{6}$, and with the point $(-7, -5)$, we get that the equation for the linear part is $V(x) = \frac{11}{6}(x + 7) - 5$.

As for when $V(x)$ is exponential, we can again find the formula using the two points shown. Assuming the general form of $V(x) = ab^x$, we have that

$$\frac{0.125}{4} = \frac{1}{32} = b^5$$

So that $b = \frac{1}{2}$. Now using the point $(1, 4)$, we get

$$a\left(\frac{1}{2}\right) = 4$$

so $a = 8$. Hence, $V(x) = 8(\frac{1}{2})^x$ on the exponential piece.

Putting them together, we get the piecewise function

$$V(x) = \begin{cases} \frac{11}{6}(x + 7) - 5 & \text{for } -7 \leq x < -1 \\ 8(\frac{1}{2})^x & \text{for } 1 \leq x \leq 6 \end{cases}$$