6. [10 points] Below is a graph of the function $S(z)$. The function has a horizontal asymptote at $y = -4$, and vertical asymptotes at $z = -4$ and $z = 3$. The point $P$ is located at the coordinates $(4, -1)$.

![Graph of S(z)]

**a.** [4 points] For $z > 3$, the formula for $S(z)$ is of the form $\log(z - h) + k$. In exact form, find the values of $h$ and $k$ using the fact that $P = (4, -1)$ and the fact that $z = 3$ is a vertical asymptote of $S(z)$.

$h = \underline{\phantom{0000}}$

$k = \underline{\phantom{0000}}$

Let $T(z) = 3S(-0.5(z - 3)) - 8$.

**Note:** The next two parts of this problem are about $T(z)$, not about the original function!

**b.** [4 points] Find the vertical asymptote(s) of $T(z)$. Circle your answer(s).

**c.** [2 points] Find $\lim_{z \to \infty} T(z)$.

$$\lim_{z \to \infty} T(z) = \underline{\phantom{0000}}$$