5. [8 points] Blizzard the snowman and his mouse friend Gabe arrived in Montana, where it has recently snowed. Since Blizzard is still melting, they decide to use this time to pack extra snow onto Blizzard, to help him make it to the North Pole. Let $H(t)$ be Blizzard's height, in inches, if Blizzard and Gabe stay in Montana for t hours. On the interval $1 \leq t < \infty$, the function $H(t)$ can be modeled by

$$H(t) = 35 + 10e^{-t/6}(t-2)^{1/3}.$$

Notice that

$$H'(t) = \frac{-5e^{-t/6}(t-4)}{3(t-2)^{2/3}}.$$

a. [6 points] Find all values of t that give global extrema of the function $H(t)$ on the interval $1 \leq t < \infty$. Use calculus to find your answers, and be sure to show enough evidence that the point(s) you find are indeed global extrema. For each answer blank, write NONE if appropriate.

Solution: The critical points of $H(t)$ occur at $t = 4$ and $t = 2$. Also checking endpoints, we have that:

- $H(1) = 26.535$
- $H(2) = 35$
- $H(4) = 41.469$
- $\lim_{t\to\infty} H(t) = 35$

and so we see that H has a global maximum when $t = 4$ and a global minimum when $t = 1$.

b. [2 points] Assuming Blizzard stays in Montana for at least 1 hour, what is the tallest height Blizzard can reach? *Remember to include units.*

Solution: Blizzard's tallest height will occur at the global maximum in the interval. Therefore, Blizzard can reach a heigh of 41.469 inches (when he's been in Montana for 4 hours).