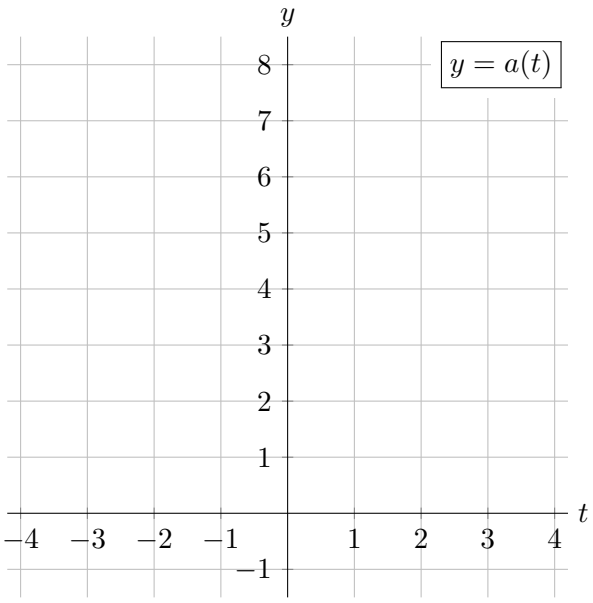
**7**. [5 points] Suppose $a(t)$ is the altitude in hundreds of meters above sea level of a certain hot air balloon $t$ hours after 12pm noon on a sunny day. Carefully draw a plausible graph of $a(t)$ on the given axes, assuming the following are true:

- the balloon lifts off the ground at 8am from a point that is 100 meters above sea level, and stays in the air until it lands at the same location at 4pm;
- the rate at which the balloon's altitude is changing is constant between 9am and 10am, and again between 2pm and 4pm;
- at 9:30am, the balloon is **ascending** twice as fast as it is **descending** at 3pm;
- the balloon spends at least one full hour at its maximum altitude of 700 meters.




**8**. [6 points] Let $g(x)$ be the piecewise function defined by

$$g(x) = \begin{cases} \dfrac{-4(x+1)}{(x^2-1)(x+4)} & x < 0 \\ e^{A(x-1)} + \dfrac{B(x+1)^2(x-2)}{2(x-3)(x-2)^2} & x \geq 0 \end{cases}$$

where $A$ and $B$ are nonzero constants.

**a**. [3 points] List the $x$-coordinates of all **vertical asymptotes** of $g(x)$.

**Answer:** $x =$ _____

**b**. [3 points] Find values of the constants $A$ and $B$ such that $g(x)$ is continuous at $x = 0$ and $g(x)$ has a **horizontal asymptote** at $y = -3$.

**Answers:** $A =$ _____ $B =$ _____