10. [4 points] Find <u>all</u> real numbers B and positive integers k such that the rational function

$$H(x) = \frac{9 + x^k}{16 - Bx^3}$$

satisfies the following two conditions:

- $H(x)$ has a vertical asymptote at $x = 2$
- $\lim_{x\to\infty} H(x)$ exists.

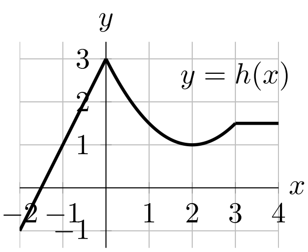
If no such values exist, write NONE.

Justification: In order for $\lim_{x\to\infty} H(x)$ to exist, the degree of the polynomial in the numerator has to be smaller or equal to 3 (the degree of the polynomial in the denominator). In order for $x = 2$ to be a vertical asymptote, you need the denominator to be zero. Hence $16 - B(2^3) = 16 - 8B = 0$ which requires $B = 2$. In this case $H(x) = \dfrac{9 + x^k}{16 - 2x^3}$ with $k = 1, 2$ or 3. Since $9 + 2^k \neq 0$, then $H(x)$ has a vertical asymptote at $x = 2$ when $B = 2$.

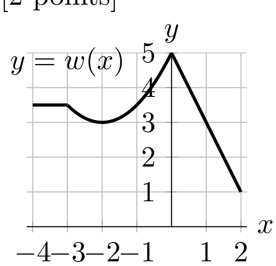
Answer: $B =$ **2** **Answer:** $k =$ **1, 2, or 3**

11. [4 points] A part of the graph of a function $h(x)$ is given below.

In each of the following parts, the corresponding portion of the graph of a function obtained from h by one or more transformations is shown, together with a list of possible formulas for that function. In each case choose the one correct formula for the function shown. *Note that the graphs are not all drawn at the same scale.*



a. [2 points]



A. $h(-x) - 2$

B. $-h(x) - 2$

C. $-h(x) + 2$

D. $\boxed{h(-x) + 2}$

E. $-h(x + 2)$

F. $-h(x - 2)$

G. $-h(-x + 2)$

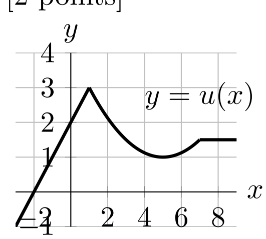
H. $-h(-x - 2)$

I. $h(-x + 2)$

J. $h(-x - 2)$

K. NONE OF THESE

b. [2 points]



A. $h(0.5x + 1)$

B. $h(0.5x - 1)$

C. $\boxed{h(0.5(x - 1))}$

D. $h(0.5(x + 1))$

E. $h(0.5(x - 0.5))$

F. $h(2x - 1)$

G. $h(2x + 1)$

H. $h(2(x - 1))$

I. $h(2(x + 1))$

J. $h(0.5(x + 0.5))$

K. NONE OF THESE