8. [8 points] On the axes provided below, sketch the graph of a single function \( y = g(x) \) satisfying all of the following:

- \( g(x) \) is defined for all \( x \) in the interval \(-5 < x < 5\).
- \( g'(x) > 0 \) for all \( x < 0 \).
- \( g(x) \) has a point of discontinuity at \( x = 1 \).
- The average rate of change of \( g(x) \) between \( x = -2 \) and \( x = 2 \) is 0.
- \( g(x) > 0 \) for all \( x > 3 \).
- \( g'(x) < 0 \) for all \( x > 4 \).

Make sure that your sketch is large and unambiguous.

\[
\begin{array}{c|c|c|c|c|c|c|c|c}
\hline
x & -5 & -4 & -3 & -2 & -1 & 1 & 2 & 3 & 4 & 5 \\
\hline
y & \text{ } & \text{ } & \text{ } & \text{ } & \text{ } & \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\
\hline
\end{array}
\]

\[y = g(x)\]

\[x\]

\[\text{Solution:}\] Many possibilities exist. Note that in order to satisfy the fourth property, we must have \( g(-2) = g(2) \).

9. [3 points] Find all vertical and horizontal asymptotes of the graph of

\[
g(x) = \frac{k(x - a)(x - b)}{(x - a)(x - c)^2}
\]

where \( a, b, c, \) and \( k \) are constants with \( a < b < c < k \). If there are none, write \text{NONE}.

**Horizontal asymptote(s):** \( y = 0 \)

**Vertical asymptote(s):** \( x = c \)