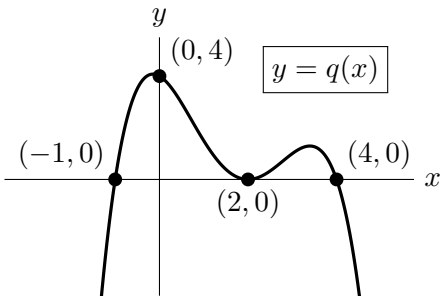
9. [10 points] Parts **a.** – **c.** below are not related. You do not need to show work on this page, but partial credit may be earned for work shown.

a. [4 points] A portion of the graph of a polynomial function $q(x)$ is shown below. Find a possible formula for $q(x)$ of the smallest possible degree. Assume that all of the key features of the graph are shown.



Answer: $q(x) =$ _____

b. [3 points] Find the formula for a rational function $r(x)$ that has a hole with an x-value of 5, a vertical asymptote at $x = 1$, and a horizontal asymptote at $y = -2$.

Answer: $r(x) =$ _____

c. [3 points] Consider the function

$$z(x) = \frac{4^{-x} - 2x^2}{15x + 3x^2}.$$

Find $\lim_{x\to\infty} z(x)$ and $\lim_{x\to-\infty} z(x)$. If the value does not represent a real number (including the case of limits that diverge to ∞ or $-\infty$), write "DNE" or "does not exist."

Answer: $\lim_{x\to\infty} z(x) =$ _____ and $\lim_{x\to-\infty} z(x) =$ _____