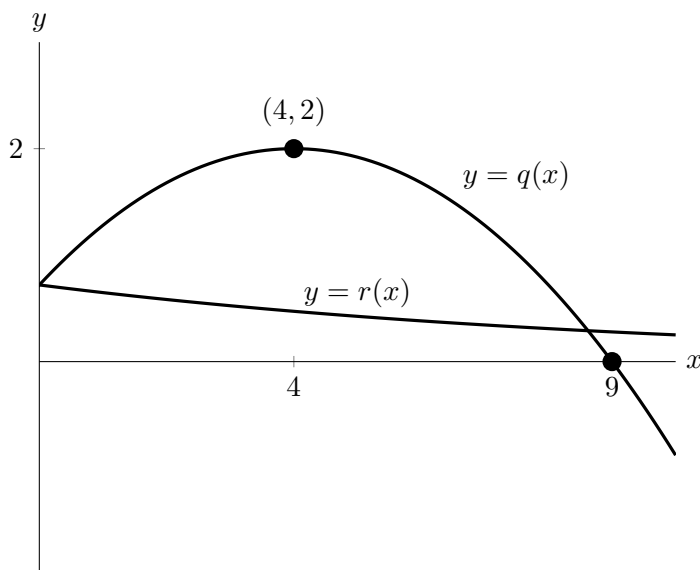


3. [11 points] The graph below shows **part** of
- a quadratic function $q(x)$ with vertex and one zero marked
 - an exponential function $r(x) = ab^x$ that intersects $q(x)$ on the y -axis.



- a. [4 points] Find a formula for $q(x)$.
- b. [2 points] What is the x -coordinate of the other zero of $q(x)$?
- Recall that the formula for $r(x)$ is $r(x) = ab^x$. Use the graph and your formula for $q(x)$ to answer the following questions.
- c. [3 points] Which of the options below **could** be true? Briefly explain your answer.
- | | | |
|---------|-------------|---------|
| $a < 0$ | $0 < a < 1$ | $a > 1$ |
|---------|-------------|---------|
- d. [2 points] Which of the options below **could** be true? Briefly explain your answer.
- | | | |
|---------|-------------|---------|
| $b < 0$ | $0 < b < 1$ | $b > 1$ |
|---------|-------------|---------|
4. [9 points] An ice cream shop along the Huron river in Ann Arbor is only open in the summer. Its owner has designed a model that predicts the revenue (that is, the amount of money the shop takes in) of the shop in thousands of dollars, P , on a day where the maximum temperature is T degrees Fahrenheit. The model is described by the function $P = g(T)$, and has an inverse, $g^{-1}(P)$.
- The maximum temperature in Ann Arbor, in degrees Fahrenheit, on the d^{th} day that the shop is open for the summer, is given by the function $M(d)$.
- For each of the following, either give a practical interpretation of the given expression, or explain why the expression doesn't make sense in the context of the problem.
- a. [3 points] $g(M(13)) = 8$
- b. [3 points] $g^{-1}(5)$
- c. [3 points] $M(g^{-1}(7))$