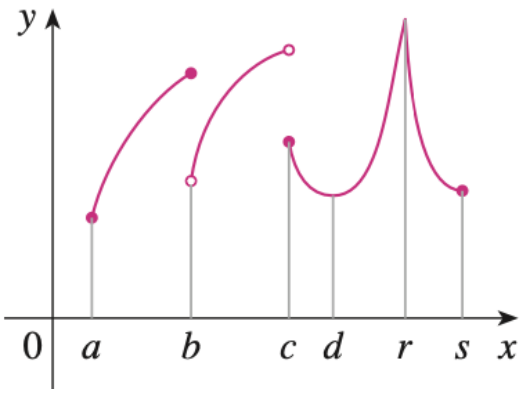
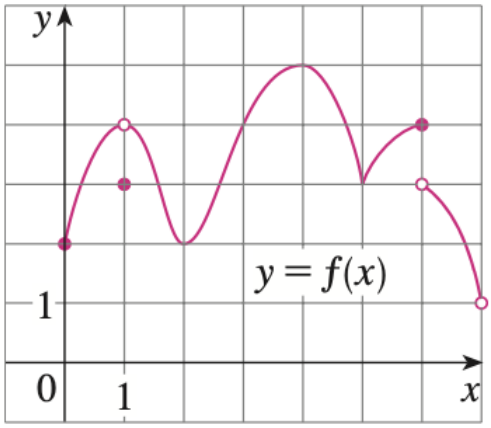
Reading Stewart §2.8, 3.1.

1. A small boat is being pulled towards a dock by a rope. The rope is tied to the bow (top front) of the boat, and at the other end it passes through a pulley on the edge of the dock. The pulley is at a level 1m higher than the bow of the boat. When the boat is 5m from the dock (i.e., horizontal distance is 5m), the rope is being pulled in at a rate of 1.5m/s. How fast is the boat approaching the dock at that time? Make sure to draw and label a diagram, define your variables clearly, set up an equation, etc.

2. For each of the numbers a, b, c, d, r, and s, state whether the function whose graph is shown has an absolute maximum or min- imum, a local maximum or minimum, or neither a maximum nor a minimum.



3. Use the graph to state the absolute and local maximum and minimum values of the function.



4. Sketch the graph of a function $f(x)$ that is continuous on the interval $[-1, 4]$ and that has an absolute maximum at $x = 3$, an absolute minimum at $x = 4$, and a local minimum at $x = 0$.

5. Let $f(x) = \frac{4}{x+2}$ on the interval $[0, 6]$.

   a) Use translation, etc., to graph $y = f(x)$ on this interval.

   b) Based on your graph, find the absolute maximum and minimum values of $f(x)$ on $[0, 6]$.

6. Find all the critical numbers of the following functions. Don't forget to verify that you have found *all* critical numbers, i.e., (briefly) explain not only why the numbers you found are critical, but why all the *other* numbers are not.

   a) $f(x) = 2x^3 + 3x^2 - 36x + 8$

   b) $g(x) = x^{4/3} - 4x^{1/3}$