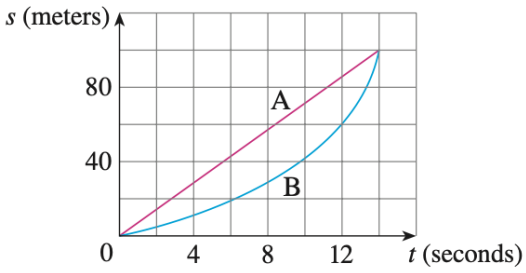
**Reading** Stewart §2.2

1. Shown are graphs of the position functions of two runners, A and B, who run a 100-meter race and finish in a tie.



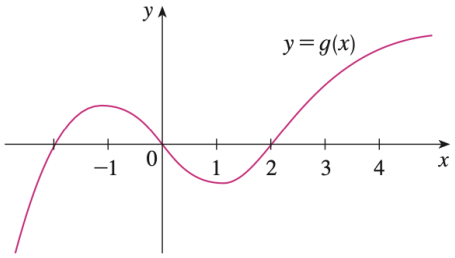

   (a) Describe and compare how the runners run the race.

   (b) At what time is the distance between the runners the greatest?

   (c) At what time do they have the same velocity?

2. For the function t whose graph is given, arrange the following numbers in increasing order and explain your reasoning:

   0 $\quad g'(-2) \quad g'(0) \quad g'(2) \quad g'(4)$



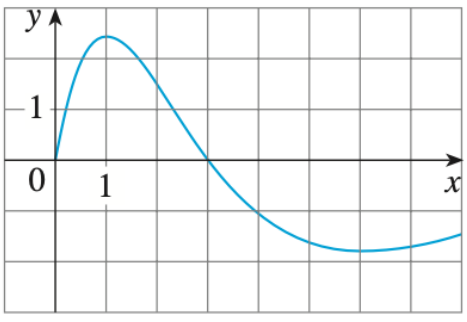

3. Let $g(x) = \dfrac{2x+7}{x+3}$. Compute $g'(x)$ using the **limit definition of the derivative**.

4. The following limit is the value of $f'(a)$ for some function $f(x)$ and some number $a$. Give such a function $f$ and number $a$, and (briefly) say why $f'(a)$ is this limit:

$$\lim_{h\to 0} \frac{\sqrt[4]{16+h}-2}{h}.$$

5. Let $B(t)$ be the number of bacteria at time $t$ (measured in hours after noon) in a certain petri dish in a certain lab in the Science Center. Say in words what the derivative $B'(7)$ means. Also say what its units are.

6. Use the given graph $y = f(x)$ to estimate the value of each derivative. Then sketch the graph $y = f'(x)$.




   a) $f'(-3)$ $\quad$ b) $f'(-2)$ $\quad$ c) $f'(-1)$

   d) $f'(0)$ $\quad$ e) $f'(1)$ $\quad$ f) $f'(2)$

   g) $f'(3)$

7. Use the **limit definition of the derivative** to find $f'(x)$, where $f(x) = \dfrac{1}{\sqrt{x}}$.

8. Use the **limit definition of the derivative** to find $g'(x)$, where $g(x) = \dfrac{1}{5 - x^2}$