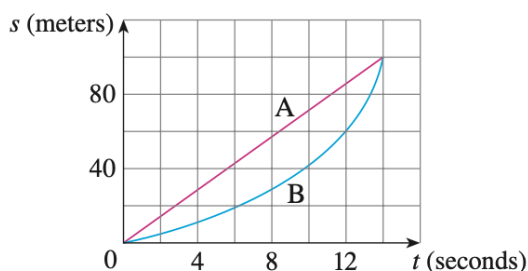


Reading Stewart §2.2

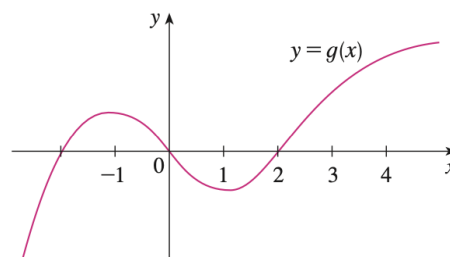
1. Shown are graphs of the position functions of two runners, A and B, who run a 100-meter race and finish in a tie.



- Describe and compare how the runners run the race.
- At what time is the distance between the runners the greatest?
- 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:

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



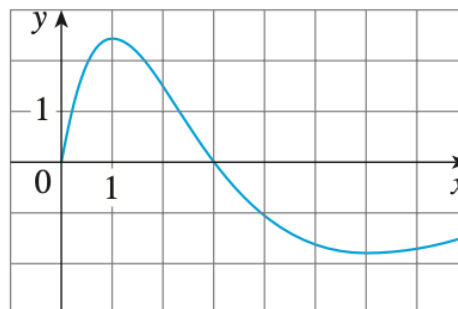
3. Let  $g(x) = \frac{2x+7}{x+3}$ . Compute  $g'(x)$  using the **limit definition of the derivative**.
4. The following limit is the value of  $f'(a)$  for some function  $f(x)$  and some number  $a$ . Give such a function  $f$  and number  $a$ , and (briefly) say why  $f'(a)$  is this limit:

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

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) $f'(0)$ | b) $f'(1)$ | c) $f'(2)$ |
| d) $f'(3)$ | e) $f'(4)$ | f) $f'(5)$ |
| g) $f'(6)$ | h) $f'(7)$ |            |



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