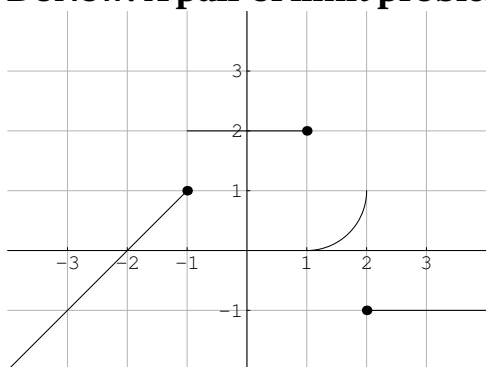
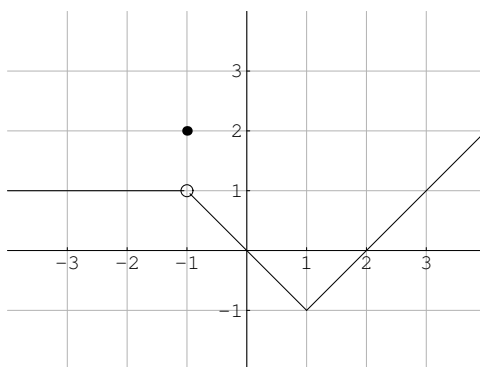


1. DoNow: A pair of limit problems

 $f(x)$  $g(x)$

Determine whether the following limits exist and find the limit when it exists. Briefly state your thinking using words, equations, and or sketches.

(a) $\lim_{x \rightarrow -1^+} g(f(x) - 3)$

(b) $\lim_{x \rightarrow 1^+} g(f(x) - 1)$

2. Follow That Particle!

For 4.95 seconds, a particle moves along the x -axis according to the position function

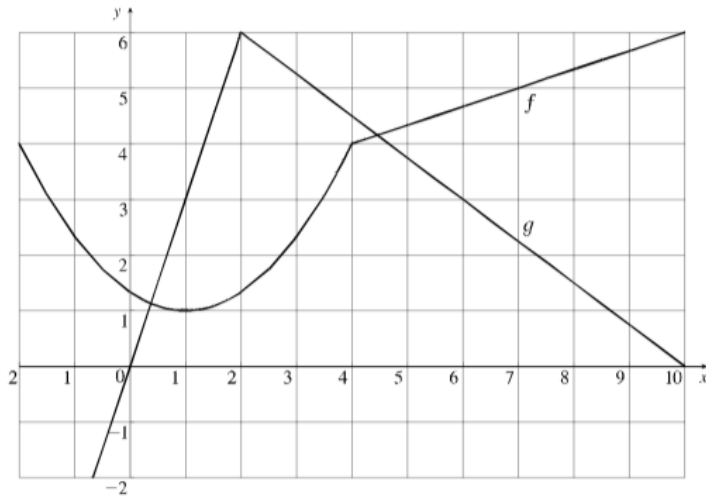
$$x(t) = \frac{e^t(5-t) - 5}{5}$$

where t is measured in seconds and x in centimeters.

Answer the following questions. Though you can visualize this motion and verify many of your answers using a graph, first attempt all the problems by hand, and then graph the position function to verify your answers.

- What is the position of the particle at $t = 0$, $t = 1$, $t = 2$, $t = 4.95$?
- Find the velocity of the particle at time t .
What is the velocity of the particle at $t = 0$, $t = 1$, $t = 2$, $t = 4.95$?
- When is the particle at rest?
When is the particle moving forward?
- Find the total distance traveled by the particle on the intervals $[0, 1]$ and $[1, 2]$.
Which is larger and why?
- Find the acceleration of the particle at time t .
- When was the particle speeding up?
Slowing down?

3. Chain Rule and Graphs



Define $h(x) = f \circ g(x)$.

- Compute $h'(1)$.
- Compute $h'(0)$.
- Does $h'(2)$ exist?

4. We know that when $y = e^x$, $\frac{dy}{dx} = e^x$.

Demonstrate how to use this fact to find the derivatives of:

- $f(x) = b^x$
- $g(x) = \ln x$

5. Let $s(x) = \log_{10}(x)$. Demonstrate how to find an equation for $s'(x)$.