1. A dose of antibiotic is given to a patient. Let $Q(t)$ denote the amount of antibiotic (in mg) in her bloodstream after $t$ hours.

(a) Write in words the meaning of the statement $Q(3) = 200$. Use correct units.
(b) Write in words the meaning of the statement $Q'(3) = -15$. Use correct units.
(c) About what would you expect the level of antibiotic to be after 3 hours and 20 minutes? Explain.

2. The graph of $f'$ (the derivative of $f$) is shown below.

(a) On the same axes, sketch the graph of $f''$.
(b) On what intervals is the function $f$ increasing? decreasing?
(c) On what intervals is the function $f$ concave up? concave down?

3. Let $f(x) = \begin{cases} 2 - x & x \leq 1 \\ \frac{1}{2}(x + 1) & x \geq 1 \end{cases}$.

(a) Sketch the graph of $f$ over the interval $0 \leq x \leq 2$.
(b) Use the graph to find $f'(x)$ for $x < 1$. Hint: This portion of the graph is a straight line; find its slope. Now use the same reasoning to find $f'(x)$ for $x > 1$.
(c) Use the definition of the derivative to express $f'(1)$ as a limit. Show that this limit does not exist by considering the limits from the left and right separately.
(d) Sketch the graph of $f'$ over the interval $0 \leq x \leq 2$. 