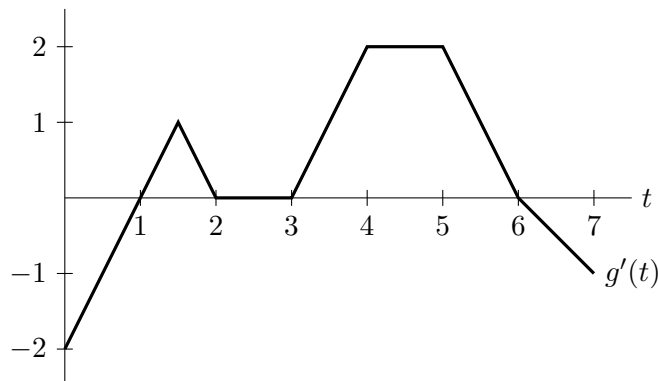**3**. [12 points] The function $g(t)$ is the volume of water in the town water tank, in thousands of gallons, t hours after 8 A.M. A graph of $g'(t)$, the **derivative** of $g(t)$, is shown below. Note that $g'(t)$ is a piecewise-linear function.

a. [4 points] Write an integral which represents the average rate of change, in thousands of gallons per hour, of the volume of water in the tank between 9 A.M. and 1 P.M. Compute the exact value of this integral.

b. [2 points] At what time does the tank have the most water in it? At what time does it have the least water?

Answer: The tank has the most water in it at _____.

The tank has the least water in it at _____.

c. [6 points] Suppose that $g(3) = 1$. Sketch a detailed graph of $g(t)$ and give both coordinates of the point on the graph at $t = 7$.