4. A squirrel starts at building A at time $t = 0$ and travels along a straight, horizontal wire connected to building B. For $0 \leq t \leq 18$, the squirrel’s velocity is modeled by the piecewise-linear function defined by the graph above.

(a) At what times in the interval $0 < t < 18$, if any, does the squirrel change direction? Give a reason for your answer.

(b) At what time in the interval $0 \leq t \leq 18$ is the squirrel farthest from building A? How far from building A is the squirrel at that time?

(c) Find the total distance the squirrel travels during the time interval $0 \leq t \leq 18$.

(d) Write expressions for the squirrel’s acceleration $a(t)$, velocity $v(t)$, and distance $x(t)$ from building A that are valid for the time interval $7 < t < 10$. 

https://secure-media.collegeboard.org/apc/ap10_frd_calculus_ab_formb.pdf
3. The rate of fuel consumption, in gallons per minute, recorded during an airplane flight is given by a twice-differentiable and strictly increasing function $R$ of time $t$. The graph of $R$ and a table of selected values of $R(t)$, for the time interval $0 \leq t \leq 90$ minutes, are shown above.

(a) Use data from the table to find an approximation for $R'(45)$. Show the computations that lead to your answer. Indicate units of measure.

(b) The rate of fuel consumption is increasing fastest at time $t = 45$ minutes. What is the value of $R''(45)$? Explain your reasoning.

(c) Approximate the value of $\int_0^{90} R(t) \, dt$ using a left Riemann sum with the five subintervals indicated by the data in the table. Is this numerical approximation less than the value of $\int_0^{90} R(t) \, dt$? Explain your reasoning.

(d) For $0 < b \leq 90$ minutes, explain the meaning of $\int_0^b R(t) \, dt$ in terms of fuel consumption for the plane.

Explain the meaning of $\frac{1}{b} \int_0^b R(t) \, dt$ in terms of fuel consumption for the plane. Indicate units of measure in both answers.