**9.** [8 points] The *Lambda* app, developed by your friends, displays information about a train that departed the Detroit station at noon and is traveling on the track between Detroit and Ann Arbor.

The app shows you several values of $\lambda(t)$, the differentiable function that gives the distance along the track, in kilometers, from the Detroit station to the train t minutes after noon:

t	37	39	41	43	45
$\lambda(t)$	16	16	24	30	36

The graph of $\lambda'(t)$, the <u>derivative</u> of $\lambda(t)$, for $0 \leqslant t \leqslant 37$, is also shown:
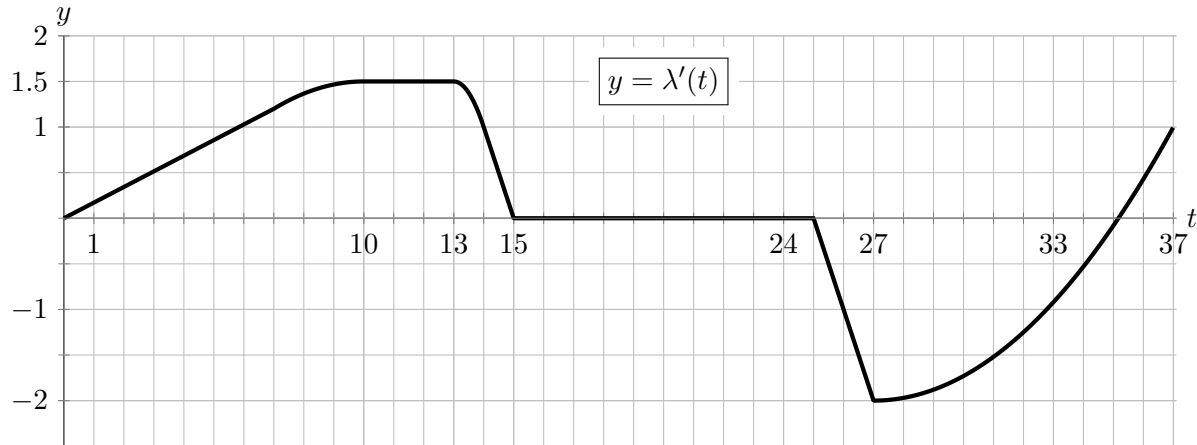
For parts **a.** and **b.**, you may estimate values from the graph as needed.

a. [1 point] Find all times t for $0 < t < 37$ when the train is traveling at its maximum *velocity*. Give your answer as value(s) and/or interval(s) of t.

Answer: _____ $(10, 13)$ _____

b. [1 point] Find all times t for $0 < t < 37$ when the train is traveling at its maximum *speed*. Give your answer as value(s) and/or interval(s) of t.

Answer: _____ 27 _____

c. [2 points] Find the average velocity of the train between 12:00pm and 12:45pm. Include units.

Answer: $\dfrac{36}{45} = \dfrac{4}{5}$ **km per minute**

d. [2 points] Estimate the instantaneous velocity of the train at $t = 41$. Include units.

Solution: $\frac{24-16}{41-39} = \frac{8}{2} = 4$, or $\frac{30-24}{43-41} = \frac{6}{2} = 3$, or the average of these, or $\frac{30-16}{43-39} = \frac{14}{4}$ km per minute

Answer: _ **3.5 km per minute** _

e. [2 points] During which of the following time intervals is the train stopped for the entire time? Circle <u>all</u> correct choices.

     $(3, 5)$ $(10, 13)$ $\boxed{(18, 21)}$ $(41, 45)$ NONE OF THESE