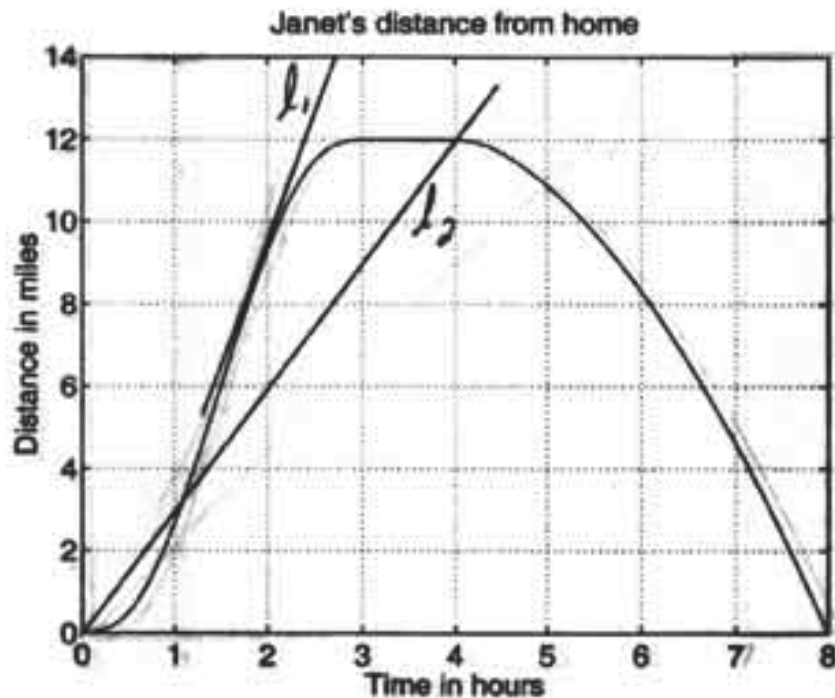


11. (16 points) Janet rides her bicycle on a day trip (8 hours) along a straight north-south road. Her distance $s(t)$ in miles north of her home t hours after her trip begins is given by the following graph.



(a) Which is larger? Janet's average velocity for the first four hours or her instantaneous velocity two hours after the start of the trip? Explain.

Janet's instantaneous velocity two hours after the start is larger than the average for the first 4 hours. The slope of the line l_1 is greater than l_2 . (See graph.)

(b) Did Janet stop during her trip? Explain.

Yes. The interval from about $t=3$ to $t=4$ indicates that her distance is neither increasing or decreasing. Her velocity is zero. Janet is stopped.

(c) Approximately when after the start of the trip is Janet riding the fastest? Explain.

This would occur when her velocity is greatest, therefore the slope of the graph (or tangent to the graph) is greatest. It appears to be at around $t \approx 1.5$ hrs. (see above)

(d) Are there any time intervals over which Janet's acceleration is positive? If so, which? Explain why you know this.

Yes. Acceleration is positive for about the first 1.5 hours. This can be seen on the graph above when the function is concave up. Over that interval, f' (or velocity) is increasing.

Continuation of problem 11

(e) On the set of axes provided here, draw a graph of Janet's velocity. Be sure to label relevant axes with appropriate units and select an appropriate numerical scale for them. To help you in sketching the graph, another copy of the graph of $s(t)$ is included below the axes where you should sketch your graph of Janet's velocity.

11. (e)

