

6. [12 points] The rate  $q(t)$  at which cars passed through the intersection of Main Street and Huron after a football game is presented in the table below.

$t$ (in minutes after the game ended)	0	20	40	60	80	100	120
$q(t)$ (in cars per minute)	10	15	19	21	20	17	13

- a. [4 points] What is the meaning of  $\int_0^{120} q(t) dt$ ? Using a left Riemann sum and  $n = 6$ , estimate  $\int_0^{120} q(t) dt$ . (Write out the terms of your sum.)

- b. [2 points] Write an expression for the average rate at which cars passed through the intersection for the first two hours after the game ended.

- c. [3 points] Estimate  $q'(30)$ .

- d. [3 points] If  $Q(t)$  denotes the total number of cars that have passed through the intersection  $t$  minutes after the game ended, find and interpret  $Q'(60)$ .