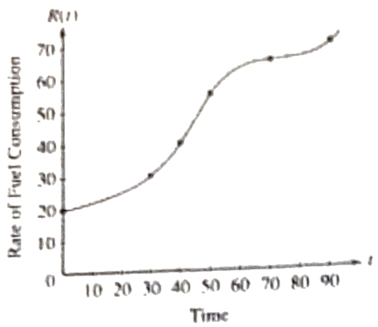
FRQ43



t (minutes)	$R(t)$ (gallons per minute)
0	20
30	30
40	40
50	55
70	65
90	70

The rate of fuel consumption, in gal/min, is given by a twice differentiable and strictly increasing function R(t).

(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.

$R'(45) = \frac{55-40}{50-40} = 1.5$ gals/min^2.

(b) The rate of fuel consumption is increasing fastest at time t = 45 minutes. What is the value of R"(45)? Explain your reasoning.

$R''(45) = 0$

max most have $R''(45)$ of 0, as that would result in the critical point.

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

$R(t)dt = (30)(20) + (40-30)(30) + (50-40)(40) + (70-50)(55) + (90-70)(65)$

$= 3750$

Because R(t) is increasing, left reiman sum would result in an under

(d) For 0 < b ≤ 90 minutes, explain the meaning of $\int_0^{b} R(t)dt$ in terms of fuel consumption. Indicate units of measure.

$\int_0^b R(t)dt$ is the amount of fuel consumption on $[0,b]$ gallons.

(e) Explain the meaning of $\frac{1}{b}\int_0^{90} R(t)dt$ in terms of fuel consumption. Indicate units of measure.

Avery rate of fuel consumption on $[0,b]$.

gal/min.