Let $y(t)$ represent the population of a town over a 20-year period, where y is a differentiable function of t. The table below shows the population recorded at selected times.

t (yrs)	0	4	10	13	20
$y(t)$ (people)	2500	2724	3108	3697	4283

1. Use data from the table to find an approximation for $y'(12)$, and explain the meaning of $y'(12)$ in terms of the population of the town. Show the computations that lead to your answer.

2. Use data from the table and a trapezoidal approximation with four subintervals to approximate the average population of the town over the 20-year period. Show the computations that lead to your answer.

The rate at which water flows into a tank, in gallons per hour, is given by a positive continuous function R of time t. The table below shows the rate at selected values of t for a 12-hour period.

t (hrs)	0	2	4	6	8	10	12
$R(t)$ (gal/hr)	12.5	13.4	13.9	14.3	14.6	14.8	14.7

3. Use a midpoint Riemann sum with three subintervals to approximate:

$$\int_0^{12} R(t)dt,$$

and explain the meaning of this definite integral in terms of the water flow, using correct units. Show the computations that lead to your answer.

4. A model for the rate of water flow is given by the function:

$$P(t)=\frac{1}{60}\left(750+24t-t^2\right)$$

where the positive rate P is measured in gallons per hour and the time t is measured in hours. Use $P(t)$ to find the average rate of water flow during the 12-hour time period. Indicate units of measure.

Particle A moves along a horizontal line with a velocity $v_A(t)$, where $v_A(t)$ is a positive continuous function of t. The time t is measured in seconds, and the velocity is measured in cm/sec. The velocity $v_A(t)$ of the particle at selected times is given in the table below.

t (sec)	0	2	5	7	10
$v_A(t)$ (cm/sec)	1.7	6.8	7.4	15.6	24.9

5. Use data from the table to approximate the distance traveled by particle A over the interval $0 \le t \le 10$ seconds by using a right Riemann sum with four subintervals. Show the computations that lead to your answer, and indicate units of measure.

6. Particle B moves along the same line with an acceleration of $a_B(t)=2t-7$ cm/sec^2. At time $t = 1$ second, the velocity of particle B is 13 cm/sec. Which particle is traveling faster at time $t = 5$ seconds? Explain your answer.