Using Riemann Sums

1. Use the data below and 4 sub-intervals to approximate the area under the curve using Right Riemann Sums, Left Riemann Sums, and the Trapezoid Rule.

t	0	2	5	9	10
H(t)	66	60	52	44	43

2. Use the data below and 4 sub-intervals to approximate the area under the curve using the Trapezoid Rule.

t(hours)	0	2	5	7	8
E(t) (hundreds of entries)	0	4	13	21	23

3. Let f be a function that is twice differentiable for all real numbers. The table gives values of f for selected points in the closed interval $2 \leq x \leq 13$.

x	2	3	5	8	13
f(x)	1	4	-2	3	6

Use a left Riemann sum with 4 subintervals indicated by the data in the table to approximate $\int_2^{13} f(x)dx$. Show the work that leads to your answer.

4. Use the data below to approximate the area under the curve using Midpoint Riemann Sums with 3 sub-intervals and the Trapezoid Rule with 6 sub-intervals.

T	0	2	4	6	8	10	12
P(t)	0	46	53	57	60	62	63

5. Use the data below to approximate the area under the curve using Right Riemann Sums and Left Riemann Sums with 5 sub-intervals.

T	0	8	20	25	32	40
P(t)	3	5	-10	-8	-4	7

6. Use the data below to approximate the area under the curve using the Trapezoid Rule and 5 sub-intervals.

T	0	2	5	7	11	12
P(t)	5.7	4	2	1.2	.6	.5

7. Use the data below to approximate the area under the curve using Midpoint Riemann Sums with 4 sub-intervals and the Trapezoid Rule with 8 sub-intervals.

t	0	10	20	30	40	50	60	70	80
V(t)	5	14	22	29	35	40	44	47	49

8. Use the data below to approximate the area under the curve using Right Riemann Sums and Left Riemann Sums with 4 sub-intervals,

T	0	1	5	6	8
P(t)	100	93	70	62	55

9. Use the data below to find the distance the car traveled from 30 seconds to 60 seconds using the Trapezoid Rule with 3 sub-intervals.

T (sec)	0	15	25	30	35	50	60
V(t) ft/sec	-20	-30	-20	-14	-10	0	10

10. Use the data below to find the cars change in velocity from 0 seconds to 30 seconds using the Trapezoid Rule with 3 sub-intervals.

T (sec)	0	15	25	30	35	50	60
a(t) ft/sec^2	1	5	2	1	2	4	2

11. Use the data below to approximate the area under the curve using Midpoint Riemann Sums with 2 sub-intervals and the Trapezoid Rule with 4 sub-intervals.

T	0	3	6	9	12
W(t)	20	31	28	24	22

12. Use the data below to approximate the area under the curve using Right Riemann Sums and Left Riemann Sums with 5 sub-intervals.

T	0	30	40	50	70	90
R(t)	20	30	40	55	65	70

13. Use the data below to approximate the area under the curve using a midpoint Riemann sum with 3 sub-intervals

T (sec)	0	60	120	180	240	300	360
a(t) ft/sec^2	24	30	28	30	26	24	26

14. Use the data below to approximate the area under the curve using a Midpoint Riemann Sums with 4 sub-intervals and the trapezoid rule with 8 sub-intervals.

t	0	5	10	15	20	25	30	35	40
V(t)	7	9.2	9.5	7	4.5	2.4	2.4	4.3	7.3

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Hot water is dripping through a coffeemaker, filling a large cup with coffee. The amount of coffee in the cup at time t, $0 \le t \le 6$, is given by a differentiable function C, where t is measured in minutes. Selected values of C(t), measured in ounces, are given in the table.

t(minutes)	0	1	2	3	4	5	6
C(t) ounces	0	5.3	8.8	11.2	12.8	13.8	14.5

Use a midpoint sum with three subinterval of equal length indicated by the data in the table to approximate the value of $\int_0^6 C(t)dt$. Using correct units, explain the meaning of $\int_0^6 C(t)dt$ in the context of the problem.