CALCULUS

WORKSHEET ON RIEMANN SUMS AND TRAPEZOIDAL RULE

1. A table of values for $f(t)$ is given.

t	0	20	40	60	80	100	120
$f(t)$	1.2	2.8	4.0	4.7	5.1	5.2	4.8

(a) Estimate $\int_0^{120} f(t)$ by using a left Riemann sum with six subintervals.

(b) Estimate $\int_0^{120} f(t)$ by using a right Riemann sum with six subintervals.

(c) Estimate $\int_0^{120} f(t)$ by using a midpoint sum with three subintervals.

(d) Estimate $\int_0^{120} f(t)$ by using the trapezoidal rule with three subintervals.

---

2. A table of values for $g(t)$ is given.

t	0	40	70	90	100
$g(t)$	150	180	195	184	172

(a) Estimate $\int_0^{100} g(t)\,dt$ by using a left Riemann sum with four subintervals.

(b) Estimate $\int_0^{100} g(t)\,dt$ by using a right Riemann sum with four subintervals.

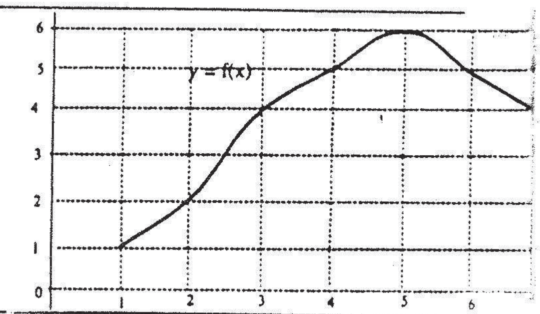
(c) Estimate $\int_0^{100} g(t)\,dt$ by using the trapezoidal rule with four subintervals.

---

3. The graph of the function f over the interval [1, 7] is shown. Using values from the graph, find trapezoidal rule estimates for the integral $\int_1^7 f(x)\,dx$ by using the indicated number of subintervals.

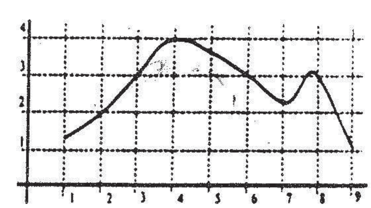
(a) n = 3

(b) n = 6



---

4. The graph of f over the interval [1, 9] is shown in the figure. Using the data in the figure, find a midpoint approximation with 4 equal subdivisions for $\int_1^9 f(x)\,dx$.



---

5. An experiment was performed in which oxygen was produced at a continuous rate. The rate at which oxygen was produced was measured each minute and the results tabulated.

minutes	0	1	2	3	4	5	6
oxygen (cu ft/min)	0	1.4	1.8	2.2	3.0	4.2	3.6

Use the trapezoid rule to estimate the total amount of oxygen produced in 6 minutes.

TURN--->>>

G 21

CALCULUS

WORKSHEET ON RIEMANN SUMS AND TRAPEZOIDAL RULE   Key

1. A table of values for $f(t)$ is given.

t	0	20	40	60	80	100	120
$f(t)$	1.2	2.8	4.0	4.7	5.1	5.2	4.8

(a) Estimate $\int_0^{120} f(t)$ by using a left Riemann sum with six subintervals. 460

(b) Estimate $\int_0^{120} f(t)$ by using a right Riemann sum with six subintervals. 532

(c) Estimate $\int_0^{120} f(t)$ by using a midpoint sum with three subintervals. 508

(d) Estimate $\int_0^{120} f(t)$ by using the trapezoidal rule with three subintervals. 484

---

2. A table of values for $g(t)$ is given.

t	0	40	70	90	100
$g(t)$	150	180	195	184	172

(a) Estimate $\int_0^{100} g(t)\,dt$ by using a left Riemann sum with four subintervals.

$L_4 = (40)(150) + 30(180) + 20(195) + 10(184)$

$6000 + 5400 + 3900 + 1840$

17,140

(b) Estimate $\int_0^{100} g(t)\,dt$ by using a right Riemann sum with four subintervals. 18,450

$R_4 = 40(180) + 30(195) + 20(184) + 10(172)$

$7200 + 5850 + 3680 + 1720$

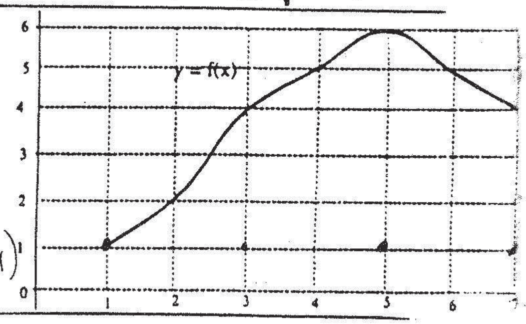
(c) Estimate $\int_0^{100} g(t)\,dt$ by using the trapezoidal rule with four subintervals. 17,795

$T_4 = \frac{1}{2}(40)(150+180) + \frac{1}{2}(30)(180+195) + \frac{1}{2}(20)(195+184) + \frac{1}{2}(10)(184+172)$

$6600 + 5625 \quad 3790 \quad 1780$

---

3. The graph of the function f over the interval [1, 7] is shown. Using values from the graph, find trapezoidal rule estimates for the integral $\int_1^7 f(x)\,dx$ by using the indicated number of subintervals.

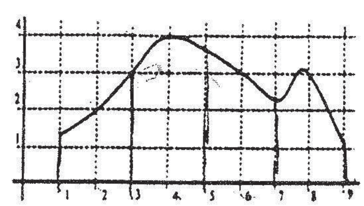


(a) n = 3 $\frac{6}{3\cdot 2} = 1(1 + 2(4) + 2(6) + 4) = 25$ 25

(b) n = 6 $\frac{6}{2\cdot 6} = \frac{1}{2}(1 + 2(2) + 2(4) + 2(5) + 2(6) + 2(5) + 4)$ 22 49/2 $\frac{49}{2}$

---

4. The graph of f over the interval [1, 9] is shown in the figure. Using the data in the figure, find a midpoint approximation with 4 equal subdivisions for $\int_1^9 f(x)\,dx$. $2(2+4+3+3) = 24$



---

5. An experiment was performed in which oxygen was produced at a continuous rate. The rate at which oxygen was produced was measured each minute and the results tabulated.

minutes	0	1	2	3	4	5	6
oxygen (cu ft/min)	0	1.4	1.8	2.2	3.0	4.2	3.6

Use the trapezoid rule to estimate the total amount of oxygen produced in 6 minutes.

$\frac{6-0}{2(6)} = \frac{1}{2}(0 + 2(1.4) + 2(1.8) + 2(2.2) + 2(3) + 2(4.2) + 3.6)$

$= 14.4$

TURN--->>>   G 21