Homework 6.2

Given below is a table of function values of $h(x)$. Approximate each of the following definite integrals using the indicated Riemann or Trapezoidal sum, using the indicated subintervals of equal length.

1. $\int_{-3}^{1} h(x)dx$ using two subintervals and a Left-Hand Riemann sum.

x	−3	−1	1	3	5	7	9
$h(x)$	5	2	−3	−7	−2	6	11

$$\int_{-3}^{1} h(x)dx \approx 2(5) + 2(2)$$
$$\approx 10 + 4$$
$$\approx 14$$

2. $\int_{-3}^{9} h(x)dx$ using three subintervals and a Right-Hand Riemann sum

x	−3	−1	1	3	5	7	9
$h(x)$	5	2	−3	−7	−2	6	11

$$\int_{-3}^{9} h(x)dx \approx 4(-3) + 4(-2) + 4(11)$$
$$\approx -12 - 8 + 44$$
$$\approx 24$$

3. $\int_{-3}^{9} h(x)dx$ using three subintervals and a Midpoint Riemann sum.

x	−3	−1	1	3	5	7	9
$h(x)$	5	2	−3	−7	−2	6	11

$$\int_{-3}^{9} h(x)dx \approx 4(2) + 4(-7) + 4(6)$$
$$\approx 8 - 28 + 24$$
$$\approx 4$$

4. $\int_{-3}^{3} h(x)dx$ using three subintervals and a Trapezoidal sum.

x	−3	−1	1	3	5	7	9
$h(x)$	5	2	−3	−7	−2	6	11

$$\int_{-3}^{3} h(x)dx \approx \tfrac{1}{2}(2)\left[5+2\right] + \tfrac{1}{2}(2)\left[2+-3\right] + \tfrac{1}{2}(2)\left[-3+-7\right]$$
$$\approx [7] + [-1] + [-10]$$
$$\approx -4$$

5. $\int_{-3}^{9} h(x)dx$ using six subintervals and a Trapezoidal sum.

x	−3	−1	1	3	5	7	9
$h(x)$	5	2	−3	−7	−2	6	11

$$\int_{-3}^{9} h(x)dx = \tfrac{1}{2}(2)\left[5 + 2(2) + 2(-3) + 2(-7) + 2(-2) + 2(6) + 11\right]$$
$$= \left[5 + 4 - 6 - 14 - 4 + 12 + 11\right]$$
$$= 8$$

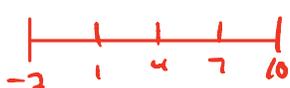6. Approximate $\int_0^\pi (2x \sin x)dx$ using four subintervals of equal length and a Right-Hand Riemann sum.

$n=4$

$\Delta x = \frac{b-a}{n} = \frac{\pi - 0}{4} = \pi/4$

$\int_0^{2\pi} (2x\sin x)dx \approx \frac{\pi}{4} \cdot f(\frac{\pi}{4}) + \frac{\pi}{4} f(\frac{\pi}{2}) + \frac{\pi}{4} \cdot f(\frac{3\pi}{4}) + \frac{\pi}{4} f(\pi)$

≈ 5.957

7. Approximate $\int_{-2}^{10} (e^2 x^2)dx$ using four subintervals of equal length and a Trapezoidal sum.

$n=4$

$\Delta x = \frac{b-a}{n} = \frac{10 - -2}{4} = \frac{12}{4} = 3$

$\int_{-2}^{10} (e^2 x^2)dx \approx \frac{1}{2}(3)\left[f(-2) + 2 \cdot f(1) + 2f(4) + 2f(7) + f(10)\right]$

≈ 2615.726

8. Given the table, approximate $\int_{-2}^9 P(x)dx$ using three subintervals and a Midpoint Riemann sum.

$n=$

x	−2	0	1	3	5	8	9
$P(x)$	5	8	2	−4	−1	2	5

$\int_{-2}^9 P(x)dx \approx 3(8) + 4(-4) + 4(2)$
$\approx 24 - 16 + 8$
≈ 16

9. Given the table, approximate $\int_{-2}^9 P(x)dx$ using six subintervals and a Trapezoidal sum.

x	−2	0	1	3	5	8	9
$P(x)$	5	8	2	−4	−1	2	5

$\int_{-2}^9 P(x)dx \approx \frac{1}{2}(2)\left[5+8\right] + \frac{1}{2}(1)\left[8+2\right] + \frac{1}{2}(2)\left[2+-4\right] + \frac{1}{2}(2)\left[4+-1\right] + \frac{1}{2}(3)\left[-1+2\right] + \frac{1}{2}(1)\left[2+5\right]$

$\approx \left[13\right] + \frac{1}{2}\left[10\right] + \left[-2\right] + \left[-5\right] + \frac{3}{2}\left[1\right] + \frac{1}{2}\left[7\right]$

$\approx 13 + 5 - 7 + \frac{6}{2}$

$\approx 11 + 5$

≈ 16