

AP Calculus AB

Name: Answer Key*

Unit 6 – Day 2 – Assignment

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.

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

<p>1. $\int_{-3}^1 h(x) dx$ using two subintervals and a Left Hand Riemann sum.</p> $2(5) + 2(2) \approx \boxed{14}$	<p>2. $\int_{-3}^9 h(x) dx$ using three subintervals and a Right Hand Riemann sum.</p> $4(-3) + 4(-2) + (4)(11) \approx \boxed{24}$
<p>3. $\int_{-3}^9 h(x) dx$ using three subintervals and a Midpoint Riemann sum.</p> $4(2) + 4(-7) + 4(6) \approx \boxed{4}$	<p>4. $\int_{-3}^3 h(x) dx$ using three subintervals and a Trapezoidal sum.</p> $\frac{1}{2}(2)[5+2] + \frac{1}{2}(2)[2+(-3)] + \frac{1}{2}(2)[(-3)+(-7)] = 7 + (-1) + (-10) \approx \boxed{-4}$
<p>5. $\int_{-3}^9 h(x) dx$ using six subintervals and a Trapezoidal sum.</p> $\frac{1}{2}(2)[5+2] + \frac{1}{2}(2)[2+(-3)] + \frac{1}{2}(2)[(-3)+(-7)] + \frac{1}{2}(2)[(-7)+(-2)] + \frac{1}{2}(2)[(-2)+6] + \frac{1}{2}(2)[6+11] = 7 + (-1) + (-10) + (-9) + 4 + 17 \approx \boxed{8}$	

$$\frac{\pi}{4}$$

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

Riemann sum.

$$\approx \frac{\pi}{4} f\left(\frac{\pi}{4}\right) + \frac{\pi}{4} f\left(\frac{\pi}{2}\right) + \frac{\pi}{4} f\left(\frac{3\pi}{4}\right) + \frac{\pi}{4} f(\pi)$$

$$\approx \frac{\pi}{4} [1.111 + 3.142 + 3.332 + 0] = \boxed{5.957}$$

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

$$\frac{12}{4} = 3$$

$$\boxed{2615.727}$$

$$\approx \frac{1}{2}(3)[f(-2) + f(1)] + \frac{1}{2}(3)[f(1) + f(4)] + \frac{1}{2}(3)[f(4) + f(7)] + \frac{1}{2}(3)[f(7) + f(10)]$$

$$\approx \frac{3}{2}(29.556 + 7.389) + \frac{3}{2}(7.389 + 118.225) + \frac{3}{2}(118.225 + 362.064) + \frac{3}{2}(362.064 + 738.906)$$

8. Given the table to the right, approximate

$$\int_{-2}^9 P(x) dx$$
 using three subintervals

and a Midpoint Riemann sum.

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

$$(3)(8) + (4)(-4) + (4)(2) \approx \boxed{16}$$

9. Given the table to the right, 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

$$\frac{1}{2}(2)[5+8] + \frac{1}{2}(1)[8+2] + \frac{1}{2}(2)[2+(-4)] + \frac{1}{2}(2)[(-4)+(-1)] + \frac{1}{2}(3)[(-1)+2] + \frac{1}{2}(1)[2+5]$$

$$13 + 5 + -2 + -5 + 1.5 + 3.5 \approx \boxed{16}$$