REVIEW 4 – Integration

Summary of Topics for Chapter 4:

Approximating area under a curve with right endpoints, left endpoints, and midpoints
Finding exact area under a curve using the definite integral
❖Definite integral and its properties
Finding a definite integral by summations
Using the ❖Fundamental Theorem of Calculus to find total change
Finding a definite integral by Fundamental Theorem of Calculus
Average value of a function and ❖Mean Value Theorem for Integrals
Accumulation Function and ❖Second Fundamental Theorem of Calculus
Finding antiderivatives of simple functions
❖Indefinite integral and its properties
Integration using the Chain Rule and Substitution
Trapezoidal Rule and Simpson's Rule
TI-CAS:

- run the programs: AREAPROX, ACUMULAT, INTEGRAL
- evaluate a summation or a limit
- evaluate a definite or indefinte integral

Suggested Review Problems from the Textbook

Pg. 318-320 Review Exercises: 3, 5, 7, 13, 15, 26, 28, 34, 36, 38, 40, 41, 43, 45, 47, 55, 60, 61, 63, 67, 69, 71, 77, 82, 87, 91 (Trapezoidal Rule only)

Pg. AP4-1 (comes between pages 322 and 323): 7, 9

Additional Suggested Review Problems

1. A particle moves along the *x*-axis so that its velocity obeys the function $v(t) = 0.1t^2 + \sin(t-1)$. If it is at $x = -4$ when $t = 8$, where is it when $t = 2$?

Answers

Suggested Review Problems from the Textbook

Pg. 318-320 Review Exercises

26. 22.5
28. $\frac{26}{3}$
34. $\int_{1}^{3} 3x\left(9-x^2\right)dx$
36. $\int_{-10}^{10} \left(100-x^2\right)dx$
82. $\frac{32\pi}{105}$
38. 18π
40. a. 3
    b. 1
    c. 0
    d. 10
60. 2; $\sqrt[3]{2}$

Pg. AP4-1 AB/BC Test Prep Questions

7. a. 0.696
   b. 0.693
   c. $f(x)$ is not defined at $x=0$.
9. a. $F(4)$ is larger. $\int_{0}^{4} f(x)dx = F(4)-F(0) = 15.5-(5.5+8) = 2$. Therefore $F(4)=F(0)+2$

   b. $\int_{1}^{3} f(x)dx = F(3)-F(1)$

   $F(3) = \int_{1}^{3} f(x)dx + F(1) = -8+9 = 1$ Since $F(1)=9$ and $F(3)=1$, by the Intermediate Value Theorem, $F(x)=5$ between $x=1$ and $x=3$.

   $\int_{3}^{4} f(x)dx = F(4)-F(3)$

   $F(4) = \int_{3}^{4} f(x)dx + F(3) = 15+1 = 16$ Since $F(3)=1$ and $F(4)=16$, by the Intermediate Value Theorem, $F(x)=5$ between $x=3$ and $x=4$.

   Hence $F(x)=5$ twice.

   c. $F(x)$ is increasing on $[3,4]$ because the curve is above the axis on that interval.

Additional Suggested Review Problems

1. $s(2) = s(8) - \int_{2}^{8} v(t)dt = -20.586$ It is at -20.586 when $t=2$