

Definite Integrals and Area

I. Evaluate the following definite integrals by finding the antiderivative. You may NOT use Math9.

1. $\int_1^4 (7x^2 - 3x + 5)dx$

2. $\int_1^9 (x^{\frac{3}{2}} + 2x + 3)dx$

3. $\int_4^9 (\sqrt{x} + \frac{1}{3\sqrt{x}})dx$

4. $\int_1^4 \frac{5}{x^3} dx$

5. $\int_{-1}^2 (1 + 3t)t^2 dt$

6. $\int_{-2}^1 (2t^2 - 1)^2 dt$

II. Use Math9 to evaluate the following definite integrals. Give decimal answers to 3 places.

1. $\int_1^4 (9x^2 - 8x + 5)dx$

2. $\int_1^9 (x^{\frac{3}{2}} + 9x + 5)dx$

3. $\int_1^4 \sqrt{x^2 + 5}dx$

4. $\int_0^3 \frac{5}{x^2 + 1} dx$

5. $\int_0^1 e^{-x^2} dx$

III. Set up and evaluate an integral expression to find the following for each function.

You may use Math9 to evaluate each integral.

- a) **Net Area** between f and the x -axis from $x = a$ to $x = b$.
- b) **Total Area** between f and the x -axis from $x = a$ to $x = b$.
- c) **Average Value** of f on the interval $[a, b]$

1. $f(x) = 3 - x^2$ $a = 0$ to $b = 3$.

2. $f(x) = -x^2 + 4x - 1$ $a = -2$ to $b = 6$.

3. $f(x) = 5 \cos(x)$ $a = 0$ to $b = \frac{3p}{2}$

4. $f(x) = x^3 + 3x^2 - 5x - 4$ $a = -3$ to $b = 3$

Answers

I.

1. $139.5 = \frac{279}{2}$

2. $200.8 = \frac{1004}{5}$

3. $13.333 = \frac{40}{3}$

4. $2.34375 = \frac{75}{32}$

5. $22.8 = \frac{114}{5}$

6. $17.4 = \frac{87}{5}$

II.

1. 144

2. $496.8 = \frac{2484}{5}$

3. 10.219

4. 6.245

5. 0.747

III.

1. a) 0

b) 6.928

c) 0

2. a) $-18.667 = -\frac{56}{3}$

b) 32.523

c) $-2.333 = -\frac{7}{3}$

3. a) -5

b) 15

c) $\frac{-10}{3p} = 1.061$

4. a) 30

b) 46.771

c) 5