

Application of Integrals — Assignment 1

Class 12 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Area Under a Curve

MCQ Questions (choose the correct option)

1. The area under the curve $y = f(x)$ from $x = a$ to $x = b$ ($f(x) \geq 0$) is

- (A) $\int_a^b f(x) \, dx$
- (B) $\int_a^b f'(x) \, dx$
- (C) $f(b) - f(a)$
- (D) $f(a) - f(b)$

2. The area bounded by the x-axis and $y = f(x)$ where $f(x) < 0$ is

- (A) $-\int_a^b f(x) \, dx$
- (B) $\int_a^b f(x) \, dx$
- (C) 0
- (D) always positive without sign

3. Area is always

- (A) non-negative
- (B) negative
- (C) zero
- (D) undefined

4. The area under $y = x$ from $x = 0$ to $x = 1$ is

- (A) $1/2$
- (B) 1
- (C) 2
- (D) 0

1 Mark Questions

1. Write the formula for the area under $y = f(x)$ from $x = a$ to $x = b$.
2. Is area positive or negative?
3. Find the area under $y = x$ from $x = 0$ to $x = 1$.

2 Mark Questions

1. Find the area under $y = x^2$ from $x = 0$ to $x = 1$.
2. Find the area under $y = x$ from $x = 0$ to $x = 2$.

3 Mark Questions

1. Find the area under $y = x^2$ from $x = 1$ to $x = 2$.
2. Find the area bounded by $y = x^2$, the x-axis and the lines $x = 1$ and $x = 3$.

Area Between Two Curves

MCQ Questions (choose the correct option)

- The area between $y = f(x)$ and $y = g(x)$ with $f(x) \geq g(x)$ is
 - $\int (f - g) dx$
 - $\int (f + g) dx$
 - $\int (g - f) dx$
 - $\int f g dx$
- The limits of integration for the area between two curves are found by
 - solving $f(x) = g(x)$
 - differentiating
 - $f(0)$
 - $g(0)$
- The area between $y = x$ and $y = x^2$ from 0 to 1 is
 - $1/6$
 - $1/2$
 - $1/3$
 - 1
- For the region between two curves, we subtract the
 - lower curve from the upper curve
 - upper curve from the lower curve
 - areas directly
 - x-axis

1 Mark Questions

- Write the formula for the area between $y = f(x)$ and $y = g(x)$, $f(x) \geq g(x)$.
- How are the limits found for the area between two curves?
- Find the points of intersection of $y = x$ and $y = x^2$.

2 Mark Questions

- Find the area between $y = x$ and $y = x^2$ from $x = 0$ to $x = 1$.
- Find the area between $y = 2x$ and $y = x^2$.

3 Mark Questions

- Find the area of the region bounded by $y = x^2$ and the line $y = x + 2$.
- Find the area between the parabola $y = x^2$ and the line $y = 4$.

Standard Bounded Regions

MCQ Questions (choose the correct option)

- The area of the circle $x^2 + y^2 = r^2$ is
 - πr^2
 - $2\pi r$
 - $\pi r^2/2$
 - $4r^2$
- The area of the ellipse $x^2/a^2 + y^2/b^2 = 1$ is

- (A) πab
 - (B) $\pi a^2 b^2$
 - (C) $\pi(a + b)$
 - (D) $\pi ab/2$
3. The area under $y = \sin x$ from 0 to π is
- (A) 2
 - (B) 1
 - (C) 0
 - (D) π
4. The area enclosed by a parabola and a line is found using
- (A) definite integrals
 - (B) derivatives
 - (C) limits only
 - (D) matrices

1 Mark Questions

1. Write the area of the circle $x^2 + y^2 = r^2$ using integration ideas.
2. Write the area of the ellipse.
3. Find the area under $y = \sin x$ from 0 to π .

2 Mark Questions

1. Find the area of the region bounded by the circle $x^2 + y^2 = 4$ (in the first quadrant).
2. Find the area under $y = \sin x$ from 0 to π .

3 Mark Questions

1. Find the area of the circle $x^2 + y^2 = 9$ using integration.
2. Find the area of the ellipse $x^2/16 + y^2/9 = 1$.

Choosing the Variable

MCQ Questions (choose the correct option)

1. If a region is easier to describe as functions of y , we integrate with respect to
 - (A) y
 - (B) x
 - (C) both
 - (D) neither
2. The area using y -limits is
 - (A) $\int (\text{right} - \text{left}) dy$
 - (B) $\int (\text{left} - \text{right}) dy$
 - (C) $\int (\text{top} - \text{bottom}) dx$
 - (D) $\int dx dy$ only
3. Choosing the correct variable
 - (A) simplifies the computation
 - (B) is irrelevant
 - (C) is impossible

(D) changes the area

4. For the region between $x = f(y)$ and $x = g(y)$, we integrate with respect to

(A) y

(B) x

(C) xy

(D) 0

1 Mark Questions

1. When do we integrate with respect to y ?

2. Write the formula for area using y -limits when $x = f(y)$ is right of $x = g(y)$.

3. Does changing the variable change the area?

2 Mark Questions

1. Find the area bounded by $x = y^2$ and the y -axis from $y = 0$ to $y = 2$.

2. Find the area between $x = y^2$ and $x = y$ (integrate with respect to y).

3 Mark Questions

1. Find the area of the region bounded by $x = y^2$ and $x = 4$.

2. Find the area bounded by the curves $x = y^2 - 1$ and $x = 1 - y^2$ using y -integration.