

# Definite Integrals and Applications of Integrals

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Section-B — JEE Main / AIEEE

1)  $\int_0^{10\pi} |\sin x| dx$  is

- a) 20
- b) 8
- c) 10
- d) 18

(2002)

2)  $I_n = \int_0^{\frac{\pi}{4}} \tan^n x dx$  then  $\lim_{n \rightarrow \infty} n[I_n + I_{n+2}]$  equals

- (a)  $\frac{1}{2}$
- (b) 1
- (c)  $\infty$
- (d) zero

(2002)

3)  $\int_0^2 [x^2] dx$  is

- a)  $2 - \sqrt{2}$
- b)  $2 + \sqrt{2}$
- c)  $\sqrt{2} - 1$
- d)  $-\sqrt{2} - \sqrt{3} + 5$

(2002)

4)  $\int_{-\pi}^{\pi} \frac{2x(1+\sin x)}{1+\cos^2 x} dx$  is

- a)  $\frac{\pi^2}{4}$
- b)  $\pi^2$
- c) zero
- d)  $\frac{\pi}{2}$

(2002)

5) If  $y = f(x)$  makes +ve intercept of 2 and 0 unit on  $x$  and  $y$  axes and encloses an area of  $\frac{3}{4}$  square unit with the axes then  $\int_0^2 xf'(x)dx$  is

- a)  $\frac{3}{2}$
- b) 1
- c)  $\frac{5}{4}$
- d)  $-\frac{3}{4}$

(2002)

6) The area bounded by the curves  $y = \ln x$ ,  $y = \ln|x|$ ,  $y = |\ln x|$  and  $y = |\ln|x||$

- a) 4 sq. units
- b) 6 sq. units
- c) 10 sq. units
- d) none of these

(2002)

7) The area of the region bounded by the curves  $y = |x - 1|$  and  $y = 3 - |x|$  is

- a) 6 sq. units
- b) 2 sq. units
- c) 3 sq. units
- d) 4 sq. units

(2003)

8) If  $f(a + b - x) = f(x)$  then  $\int_a^b xf(x)dx$  is equal to

- a)  $\frac{a+b}{2} \int_a^b f(a+b+x)dx$
- b)  $\frac{a+b}{2} \int_a^b f(b-x)dx$
- c)  $\frac{a+b}{2} \int_a^b f(x)dx$
- d)  $\frac{b-a}{2} \int_a^b f(x)dx$

(2003)

9) Let  $f(x)$  be a function satisfying  $f'(x) = f(x)$  with  $f(0) = 1$  and  $g(x)$  be a function that satisfies  $f(x) + g(x) = x^2$ . Then the value of the integral  $\int_0^1 f(x)g(x)dx$ , is

- a)  $e + \frac{e^2}{2} + \frac{5}{2}$
- b)  $e - \frac{e^2}{2} - \frac{5}{2}$
- c)  $e + \frac{e^2}{2} - \frac{5}{2}$
- d)  $e - \frac{e^2}{2} - \frac{5}{2}$

(2003)

10) The value of the integral  $I = \int_0^1 x(1-x)^n dx$  is

- a)  $\frac{1}{n+1} + \frac{1}{n+2}$
- b)  $\frac{1}{n+1}$
- c)  $\frac{1}{n+2}$

d)  $\frac{1}{n+1} - \frac{1}{n+2}$

(2003)

11)  $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{1}{n} e^{\frac{r}{n}}$  is

- a)  $e + 1$
- b)  $e - 1$
- c)  $1 - e$
- d)  $e$

(2004)

12) The value of  $\int_{-2}^3 |1 - x^2| dx$  is

- a)  $\frac{1}{3}$
- b)  $\frac{14}{3}$
- c)  $\frac{7}{3}$
- d)  $\frac{28}{3}$

(2004)

13) The value of  $I = \int_0^{\frac{\pi}{2}} \frac{(\sin x + \cos x)^2}{\sqrt{1 + \sin 2x}} dx$  is

- a) 3
- b) 1
- c) 2
- d) 0

(2004)

14) If  $\int_0^{\pi} x f(\sin x) dx = A \int_0^{\frac{\pi}{2}} f(\sin x) dx$ , then  $A$  is

- a)  $2\pi$
- b)  $\pi$
- c)  $\frac{\pi}{4}$
- d) 0

(2004)

15) If  $f(x) = \frac{e^x}{1+e^x}$ ,  $I_1 = \int_{f(-a)}^{f(a)} x g x (1-x) dx$  and  $I_2 =$

$\int_{f(-a)}^{f(a)} g x (1-x) dx$ , then the value of  $\frac{I_2}{I_1}$  is

- a) 1
- b) -3
- c) -1
- d) 2

(2004)