

## Definite Integrals Ex 20.5 Q5

We have,
$$\int_{h=0}^{b} f(x) dx = \lim_{h \to 0} h \left[ f(a) + f(a+h) + f(a+2h) + - - - - f(a+(n-1)h) \right]$$
where  $h = \frac{b-a}{n}$ 

Here  $a = 0, b = 5$ 
and  $f(x) = (x+1)$ 

$$\therefore h = \frac{5}{n} \Rightarrow nh = 5$$

Thus, we have,
$$I = \lim_{h \to 0} h \left[ f(0) + f(h) + f(2h) + - - - - f\left\{ (n-1)h \right\} \right]$$

$$= \lim_{h \to 0} h \left[ 1 + (h+1) + (2h+1) + - - - + \left\{ (n-1)h + 1 \right\} \right]$$

$$= \lim_{h \to 0} h \left[ n + h \left( 1 + 2 + 3 + - - - - (n-1) \right) \right]$$

$$\therefore h = \frac{5}{n} \text{ and if } h \to 0, n \to \infty$$

$$= \lim_{h \to \infty} \frac{5}{n} \left[ n + \frac{5}{n} \frac{n(n-1)}{2} \right]$$

$$= \lim_{h \to \infty} 5 + \frac{25}{2n^2} n^2 \left( 1 - \frac{1}{n} \right)$$

$$= 5 + \frac{25}{2}$$

$$\therefore \int_{0}^{5} (x+1) dx = \frac{35}{2}$$

Definite Integrals Ex 20.5 Q6

We have,

$$\int_{a}^{b} f(x) dx = \lim_{h \to 0} h \Big[ f(a) + f(a+h) + f(a+2h) + \dots - f(a+(n-1)h) \Big]$$
where  $h = \frac{b-a}{b}$ 

Here, 
$$a = 1$$
,  $b = 3$   
and  $f(x) = (2x + 3)$   
$$\therefore h = \frac{2}{n} \Rightarrow nh = 2$$

Thus, we have,

Thus, we have,
$$I = \int_{1}^{3} (2x+3) dx$$

$$= \lim_{h \to 0} h \Big[ f(1) + f(1+h) + f(1+2h) + \dots - f(1+(n-1)h) \Big]$$

$$= \lim_{h \to 0} h \Big[ 2 + 3 + \{2(1+h) + 3\} + \{2(1+2h) + 3\} - \dots + 2\{1+(n-1) + 3\} \Big]$$

$$= \lim_{h \to 0} h \Big[ 5 + (5+2h) + (5+4h) + \dots - 5 + 2(n-1)h \Big]$$

$$= \lim_{h \to 0} h \Big[ 5n + 2h(1+2+3+\dots - (n-1)) \Big]$$

$$\therefore h = \frac{2}{n} \text{ and if } h \to 0 \Rightarrow n \to \infty$$

$$\therefore \lim_{n \to \infty} \frac{2}{n} \Big[ 5n + \frac{4}{n} \frac{n(n-1)}{2} \Big]$$

$$= \lim_{n \to \infty} \left[ 10 + \frac{4}{n^2} \frac{n(n-1)}{2} \right] = 14$$

$$\iint_{1}^{3} (2x+3) dx = 14$$

Definite Integrals Ex 20.5 Q7

We have,

$$\int_{a}^{b} f(x) dx = \lim_{h \to 0} h \Big[ f(a) + f(a+h) + f(a+2h) + \dots - f(a+(n-1)h) \Big]$$
where  $h = \frac{b-a}{n}$ 

Here, 
$$a = 3$$
,  $b = 5$   
and  $f(x) = (2-x)$   
$$\therefore h = \frac{2}{n} \Rightarrow nh = 2$$

Thus, we have,

$$I = \int_{3}^{5} (2-x) dx$$

$$= \lim_{h \to 0} h \left[ f(3) + f(3+h) + f(3+2h) + \dots - f(3+(n-1)h) \right]$$

$$= \lim_{h \to 0} h \left[ (2-3) + \{2-(3+h)\} + \{2-(3+2h)\} + \dots - \{2-(3+(n-1)h)\} \right]$$

$$= \lim_{h \to 0} h \left[ -1 + (-1-h) + (-1-2h) + \dots - \{-1-(n-1)h\} \right]$$

$$= \lim_{h \to 0} h \left[ -n - h \left( 1 + 2 + \dots - (n-1)h \right) \right]$$

$$\therefore h = \frac{2}{n} \otimes ifh \to 0 \Rightarrow n \to \infty$$

$$\therefore \lim_{n \to \infty} \frac{2}{n} \left[ -n - \frac{2}{n} \frac{n(n-1)}{2} \right]$$

$$= \lim_{n \to \infty} -2 - \frac{2}{n^2} n^2 \left( 1 - \frac{1}{n} \right) = -2 - 2 = -4$$

$$\int_{3}^{5} (2-x) dx = -4$$

Definite Integrals Ex 20.5 Q8

We have,

$$\int_{a}^{b} f(x) dx = \lim_{h \to 0} h \Big[ f(a) + f(a+h) + f(a+2h) + \dots - f(a+(n-1)h) \Big]$$
where  $h = \frac{b-a}{b}$ 

Here 
$$a = 0$$
,  $b = 2$  and  $f(x) = (x^2 + 1)$   

$$\therefore h = \frac{2}{n} \Rightarrow nh = 2$$

$$I = \int_{0}^{2} (x^{2} + 1) dx$$

$$= \lim_{h \to 0} h \left[ f(0) + f(h) + f(2h) + \dots - f\left\{ (n-1)h \right\} \right]$$

$$= \lim_{h \to 0} h \left[ 1 + (h^{2} + 1) + \left\{ (2h)^{2} + 1 \right\} + \dots - \left\{ (n-1)h \right\}^{2} + 1 \right\}$$

$$= \lim_{h \to 0} h \left[ n + h^{2} \left( 1 + 2^{2} + 3^{2} + \dots - \dots + (n-1)^{2} \right) \right]$$

$$\therefore h = \frac{2}{n} \& \text{if } h \Rightarrow 0 \Rightarrow n \to \infty$$

$$\therefore \lim_{n \to \infty} \frac{2}{n} \left[ n + \frac{4}{n^{2}} \frac{n(n-1)(2n-1)}{6} \right]$$

$$= \lim_{n \to \infty} 2 + \frac{4}{3n^{3}} n^{3} \left( 1 - \frac{1}{n} \right) \left( 2 - \frac{1}{n} \right)$$

$$= 2 + \frac{4}{3} \times 2 = \frac{14}{3}$$

$$\int_{0}^{2} (x^{2} + 1) dx = \frac{14}{3}$$

\*\*\*\*\*\*\* END \*\*\*\*\*\*