Date Planned : __ / __ / __	Daily Tutorial Sheet - 4	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 1	Exact Duration :________

46. If $I_1 = \int_0^{\pi/2} \ln(\sin x)dx$; $I_2 = \int_{-\pi/4}^{\pi/4} \ln(\sin x + \cos x)dx$, then:

(A) $I_1 = 2I_2$ **(B)** $I_2 = 2I_1$ **(C)** $I_1 = 4I_2$ **(D)** $I_2 = 4I_1$

47. $\int_0^1 \ell n\left(\sin\frac{\pi x}{2}\right)dx$ is equal to:

(A) $\ell n 2$ **(B)** $-\ell n 2$ **(C)** $\pi \ell n 2$ **(D)** $-\pi \ell n 2$

48. If $\int_{1/2}^{2} \frac{1}{x}\text{cosec}^{101}\left(x - \frac{1}{x}\right)dx = k$ then the value of k is:

(A) 1 **(B)** $1/2$ **(C)** 0 **(D)** $1/101$

49. The value of $\int_0^{\frac{16\pi}{3}} |\sin x|\, dx$ is:

(A) $17/2$ **(B)** $19/2$ **(C)** $21/2$ **(D)** None of these

50. The value of $\int_0^{1000} e^{x-[x]}dx$, is ([.] denotes the greatest integer function):

(A) $1000e$ **(B)** $1000(e-1)$ **(C)** $1001(e-1)$ **(D)** None of these

51. The expression $\dfrac{\int_0^n [x]dx}{\int_0^n \{x\}dx}$, where $[x]$ and $\{x\}$ are integral and fractional part of x and $n \in N$, is equal to:

(A) $n+1$ **(B)** $\frac{1}{n}$ **(C)** n **(D)** $n-1$

52. Evaluate: **(a)** $\int_a^b e^x dx$; **(b)** $\int_a^b \sin x\, dx$ using limit of a sum.

53. $\lim_{n\to\infty} \frac{1}{n}\left(1 + \sqrt{\frac{n}{n+1}} + \sqrt{\frac{n}{n+2}} + \ldots + \sqrt{\frac{n}{4n-3}}\right)$ is equal to:

(A) 1 **(B)** 2 **(C)** 3 **(D)** None of these

54. $\lim_{n\to\infty} \frac{1}{n}\sum_{r=n+1}^{2n} \log_e\left(1+\frac{r}{n}\right)$ equals:

(A) $\log\left(\frac{27}{4e}\right)$ **(B)** $\log\left(\frac{27}{e^2}\right)$ **(C)** $\log\left(\frac{4}{e}\right)$ **(D)** None of these

55. The value of $\lim_{n\to\infty}\left(\frac{1}{1^3+n^3}+\frac{2^2}{2^3+n^3}+.........+\frac{n^2}{n^3+n^3}\right)$ is:

(A) $\frac{1}{3}$ **(B)** $\frac{1}{3}\log(2)$ **(C)** $\frac{1}{2}\log(3)$ **(D)** $\frac{1}{3}\log(3)$

56. Evaluate: $\lim_{n\to\infty}\left[\frac{\sqrt{n}}{\left(3+4\sqrt{n}\right)^2}+\frac{\sqrt{n}}{\sqrt{2}\left(3\sqrt{2}+4\sqrt{n}\right)^2}+\frac{\sqrt{n}}{\sqrt{3}\left(3\sqrt{3}+4\sqrt{n}\right)^2}+....+\frac{1}{49n}\right]$

(A) $\frac{1}{14}$ **(B)** $\frac{1}{16}$ **(C)** $\frac{1}{18}$ **(D)** $\frac{1}{20}$

57. Find the limit, when $n\to\infty$ of $\frac{1}{\sqrt{(2n-1^2)}}+\frac{1}{\sqrt{(4n-2^2)}}+\frac{1}{\sqrt{(6n-3^2)}}+.....+\frac{1}{n}$.

(A) $\frac{\pi}{2}$ **(B)** π **(C)** $-\frac{\pi}{2}$ **(D)** None of these

58. The value of $\lim_{n\to\infty}\left[\frac{n}{n^2}+\frac{n}{n^2+1^2}+\frac{n}{n^2+2^2}+...+\frac{n}{n^2+(n-1)^2}\right]$ is:

(A) $\frac{\pi}{2}$ **(B)** $\frac{\pi}{4}$ **(C)** π **(D)** $-\frac{\pi}{4}$

59. $\lim_{n\to\infty}\left(\frac{1}{1+n^3}+\frac{4}{8+n^3}+....+\frac{r^2}{r^3+n^3}+...+\frac{1}{2n}\right)$

(A) $\frac{1}{2}\log 2$ **(B)** $\frac{1}{3}\log 2$ **(C)** $\frac{1}{4}\log 2$ **(D)** $\log 2$

60. $\lim_{n\to\infty}\left[\frac{n+1}{n^2+1^2}+\frac{n+2}{n^2+2^2}+...+\frac{1}{n}\right]$

(A) $\frac{1}{2}\log 2$ **(B)** $-\frac{\pi}{4}+\frac{1}{2}\log 2$ **(C)** $\pi+\frac{1}{2}\log 2$ **(D)** $\frac{\pi}{4}+\frac{1}{2}\log 2$