Date Planned : __ / __ / __	Daily Tutorial Sheet - 8	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration :________

71. Let O(0, 0), A(2, 0) and $B\left(1, \frac{1}{\sqrt{3}}\right)$ be the vertices of a triangle. Let R be the region consisting of all those points P inside ΔOAB which satisfy $d(P, OA) \geq \min\{d(P, OB), d(P, AB)\}$, where d denotes the distance from the point to the corresponding line. Sketch the region R and find its area. **(1997)**

Paragraph for Questions 72 to 73

Consider the functions defined implicitly by the equation $y^3 - 3y + x = 0$ on various intervals in the real line. If $x \in (-\infty, -2) \cup (2, \infty)$, the equation implicitly defines a unique real-valued differentiable function $y = f(x)$. If $x \in (-2, 2)$, the equation implicitly defines a unique real-valued differentiable function $y = g(x)$ satisfying $g(0) = 0$.

72. If $f(-10\sqrt{2}) = 2\sqrt{2}$, then $f''\left(-10\sqrt{2}\right)$ is equal to: **(2008)**

(A) $\frac{4\sqrt{2}}{7^3 3^2}$ **(B)** $-\frac{4\sqrt{2}}{7^3 3^2}$ **(C)** $\frac{4\sqrt{2}}{7^3 3}$ **(D)** $-\frac{4\sqrt{2}}{7^3 3}$

73. The area of the region bounded by the curve $y = f(x)$, the X-axis and the lines $x = a$ and $x = b$, where $-\infty < a < b < -2$, is:

(A) $\int_a^b \frac{x}{3\left[\{f(x)\}^2 - 1\right]} dx + bf(b) - af(a)$ **(B)** $-\int_a^b \frac{x}{3\left[\{f(x)\}^2 - 1\right]} dx + bf(b) - af(a)$

(C) $\int_a^b \frac{x}{3\left[\{f(x)\}^2 - 1\right]} dx - bf(b) + af(a)$ **(D)** $-\int_a^b \frac{x}{3\left[\{f(x)\}^2 - 1\right]} dx - bf(b) + af(a)$

74. The area enclosed by the curves $y = \sin x + \cos x$ *and* $y = \left|\cos x - \sin x\right|$ over the interval $\left[0, \frac{\pi}{2}\right]$ is: **(2014)**

(A) $4\left(\sqrt{2} - 1\right)$ **(B)** $2\sqrt{2}\left(\sqrt{2} - 1\right)$ **(C)** $2\left(\sqrt{2} + 1\right)$ **(D)** $2\sqrt{2}\left(\sqrt{2} + 1\right)$

75. Let $f : \left[-1, 2\right] \to [0, \infty)$ be a continuous function such that $f\left(x\right) = f\left(1 - x\right), \forall x \in \left[-1, 2\right]$.

If $R_1 = \int_{-1}^{2} x\ f\left(x\right) dx$ *and* R_2 are the area of the region bounded by $y = f\left(x\right), x = -1, x = 2$ and the X-axis.

Then: **(2011)**

(A) $R_1 = 2R_2$ **(B)** $R_1 = 3R_2$ **(C)** $2R_1 = R_2$ **(D)** $3R_1 = R_2$

76. If the straight line $x = b$ divide the area enclosed by $y = \left(1 - x\right)^2, y = 0$ *and* $x = 0$ into two parts $R_1\left(0 \leq x \leq b\right)$ *and* $R_2\left(b \leq x \leq 1\right)$ such that $R_1 - R_2 = \frac{1}{4}$. Then, b equals: **(2011)**

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

77. The area of the region between the curves $y=\sqrt{\dfrac{1+\sin x}{\cos x}}$ and $y=\sqrt{\dfrac{1-\sin x}{\cos x}}$ bounded by the lines $x=0$ *and* $x=\dfrac{\pi}{4}$ is: **(2008)**

(A) $\displaystyle\int_0^{\sqrt{2}-1}\frac{t}{(1+t^2)\sqrt{1-t^2}}dt$ **(B)** $\displaystyle\int_0^{\sqrt{2}-1}\frac{4t}{(1+t^2)\sqrt{1-t^2}}dt$

(C) $\displaystyle\int_0^{\sqrt{2}+1}\frac{4t}{(1+t^2)\sqrt{1-t^2}}dt$ **(D)** $\displaystyle\int_0^{\sqrt{2}+1}\frac{t}{(1+t^2)\sqrt{1-t^2}}dt$

***78.** If S be the area of the region enclosed by $y=e^{-x^2}$, $y=0$, $x=0$ and $x=1$. Then: **(2012)**

(A) $S\ge\dfrac{1}{e}$ **(B)** $S\ge 1-\dfrac{1}{e}$ **(C)** $S\le\dfrac{1}{4}\left(1+\dfrac{1}{\sqrt{e}}\right)$ **(D)** $S\le\dfrac{1}{\sqrt{2}}+\dfrac{1}{\sqrt{e}}\left(1-\dfrac{1}{\sqrt{2}}\right)$

***79.** Area of the region bounded by the curve $y=e^x$ and lines $x=0$ and $y=e$ is: **(2009)**

(A) $e-1$ **(B)** $\int_1^e \ln(e+1-y)\,dy$

(C) $e-\int_0^1 e^x dx$ **(D)** $\int_1^e \ln y\,dy$

***80.** For which of the following values of m, is the area of the region bounded by the curve $y=x-x^2$ and the line $y=mx$ equals $\dfrac{9}{2}$? **(1999)**

(A) –4 **(B)** –2 **(C)** 2 **(D)** 4