4 **JEE Main 2013 (Offline)**

MCQ (Single Correct Answer)

The area (in square units) bounded by the curves $y = \sqrt{x}, 2y - x + 3 = 0$, x-axis, and lying in the first quadrant is :

A 9

B 36

C 18

D $\frac{27}{4}$

3 **JEE Main 2014 (Offline)**

MCQ (Single Correct Answer)

The area of the region described by $A = \left\{ (x, y) : x^2 + y^2 \le 1 \text{ and } y^2 \le 1 - x \right\}$ is :

A $\frac{\pi}{2} - \frac{2}{3}$

B $\frac{\pi}{2} + \frac{2}{3}$

C $\frac{\pi}{2} + \frac{4}{3}$

D $\frac{\pi}{2} - \frac{4}{3}$

Explanation

Given curves are $x^2+y^2=1$ and $y^2=1-x$.

Intersection points are $x=0,1$

Area of shaded portion is the required area.

So, Required Area $=$ Area of semi-circle $+$ Area bounded by parabola

$$=\frac{\pi r^2}{2}+2\int_0^1 \sqrt{1-x}dx$$

$$=\frac{\pi}{2}+2\int_0^1 \sqrt{1-x}\,dx$$

(As radius of circle $=1$)

$$=\frac{\pi}{2}+2\left[\frac{(1-x)^{3/2}}{-3/2}\right]_0^1$$

Let f be a non-negative function defined on the interval [0, 1]. If $\int_0^x \sqrt{1-(f'(t))^2}\,dt=\int_0^x f(t)\,dt$, $0\le x\le 1$, and $f(0)=0$, then diff it.

(A) $f\left(\frac{1}{2}\right)<\frac{1}{2}$ and $f\left(\frac{1}{3}\right)>\frac{1}{3}$

(B) $f\left(\frac{1}{2}\right)>\frac{1}{2}$ and $f\left(\frac{1}{3}\right)>\frac{1}{3}$

(C) $f\left(\frac{1}{2}\right)<\frac{1}{2}$ and $f\left(\frac{1}{3}\right)<\frac{1}{3}$

(D) $f\left(\frac{1}{2}\right)>\frac{1}{2}$ and $f\left(\frac{1}{3}\right)<\frac{1}{3}$

[2009]

C

$f'=\pm\sqrt{1-f^2}$

$\Rightarrow f(x)=\sin x$ or $f(x)=-\sin x$ (not possible)

$\Rightarrow f(x)=\sin x$

Also, $x>\sin x\ \forall\ x>0$.