1. If the area of the bounded region
$R = \left\{(x, y) : \max\{0, \log_e x\} \le y \le 2^x, \frac{1}{2} \le x \le 2\right\}$
is, $\alpha(\log_e 2)^{-1} + \beta(\log_e 2) + \gamma$, then the value of
$(\alpha + \beta - 2\gamma)^2$ is equal to :

(1) 8 (2) 2
(3) 4 (4) 1

2. Let $f(x)$= Maximum $\left\{x^2, (1-x)^2, 2x(1-x)\right\}$, where $0 \le x \le 1$. Determine the area of the region bounded by the curves $y = f(x)$, x-axis, $x = 0$ & $x = 1$

(1) $\frac{17}{27}$ (2) $\frac{15}{25}$
(3) $\frac{13}{23}$ (4) $\frac{14}{29}$

3. Given: $f(x) = \begin{cases} x & , \quad 0 \le x < \frac{1}{2} \\ \frac{1}{2} & , \quad x = \frac{1}{2} \\ 1 - x & , \quad \frac{1}{2} < x \le 1 \end{cases}$
and $g(x) = \left(x - \frac{1}{2}\right)^2, x \in R$. Then the area (in sq. units) of the region bounded by the curves, $y = f(x)$ and $y = g(x)$ between the lines, $2x = 1$ and $2x = \sqrt{3}$, is :

(1) $\frac{1}{3} + \frac{\sqrt{3}}{4}$ (2) $\frac{\sqrt{3}}{4} - \frac{1}{3}$
(3) $\frac{1}{2} - \frac{\sqrt{3}}{4}$ (4) $\frac{1}{2} + \frac{\sqrt{3}}{4}$

4. Area enclosed between the curves $|y| = 1 - x^2$ and $x^2 + y^2 = 1$ is

(1) $\frac{3\pi-8}{3}$ sq. units (2) $\frac{\pi-8}{3}$ sq. units
(3) $\frac{2\pi-8}{3}$ sq. units (4) None of these

5. The area bounded by the lines $y = 2$, $x = 1$, $x = a$ and the curve $y = f(x)$, which cuts the lines $x = 1$, $x = a$ and above the line $y = 2$ for all $a \ge 1$, is equal to $\frac{2}{3}\left[\left(2a\right)^{\frac{3}{2}} - 3a + 3 - 2\sqrt{2}\right]$. Then, $f(x) =$

(1) $2\sqrt{2x}$, $x \ge 1$ (2) $\sqrt{2x}$, $x \ge 1$
(3) $2\sqrt{x}$, $x \ge 1$ (4) x

6. The area of the region in 1st quadrant bounded by the y-axis, $y = \frac{x}{4}$, $y = 1 + \sqrt{x}$ and $y = \frac{2}{\sqrt{x}}$ is

(1) $\frac{2}{3}$ sq. unit (2) $\frac{8}{3}$ sq. unit
(3) $\frac{11}{3}$ sq. unit (4) $\frac{13}{6}$ sq. unit

7. If the area bounded by the curve $y = \cos^{-1}(\cos x)$ and $y = |x - \pi|$ is $\frac{\pi^2}{n}$, then n is equal to

8. The slope of the tangent to the curve $y = f(x)$ at a point (x, y) is $2x + 1$ and the curve passes through $(1, 2)$. The area of the region bounded by the curves, the x-axis and the line $x = 1$ is

(1) 5/3 units (2) 5/6 units
(3) 6/5 units (4) 6 units

9. The area inside the parabola $5x^2 - y = 0$ but outside the parabola $2x^2 - y + 9 = 0$ is

(1) $12\sqrt{3}$ sq. units (2) $6\sqrt{3}$ sq. units
(3) $8\sqrt{3}$ sq. units (4) $4\sqrt{3}$ sq. units

10. The area bounded by the curves $y = \ln x$, $y = \ln|x|$, $y = |\ln x|$ and $y = |\ln|x||$, for $x \in (-1, 1)$ is(in sq. units)