1. $\int_0^{1000} e^{x-[x]}\, dx$ is

   (1) $e^{1000} - 1$

   (2) $\frac{e^{1000}-1}{e-1}$

   (3) $1000(e-1)$

   (4) $\frac{e-1}{1000}$

2. Evaluate: $\int\limits_{-\pi}^{199\pi} \sqrt{\left(\frac{1-\cos 2x}{2}\right)}\, dx$

   (1) 200

   (2) 400

   (3) -200

   (4) -400

3. If $P = \int_0^{3\pi} f\left(\cos^2 x\right) dx$ and $Q = \int_0^{\pi} f\left(\cos^2 x\right) dx$, then

   (1) $P - Q = 0$

   (2) $P - 2Q = 0$

   (3) $P - 3Q = 0$

   (4) $P - 5Q = 0$

   (5) $P - 4Q = 0$

4. If $\int_0^{10\pi+\alpha} |\sin\, x|\, dx = k - \cos\, \alpha$, where $0 < \alpha < \pi$, then $k =$

   (1) 101

   (2) 100

   (3) 201

   (4) none of these

5. If $I_1 = \int_0^1 2^{x^2} dx$, $I_2 = \int_0^1 2^{x^3} dx$, $I_3 = \int_1^2 2^{x^2} dx$ and $I_4 = \int_1^2 2^{x^3} dx$, then

   (1) $I_3 > I_4$

   (2) $I_3 = I_4$

   (3) $I_1 > I_2$

   (4) $I_2 > I_1$

6. Let $g\left(x\right) = \int_0^x f(t)dt$, where $\frac{1}{2} \le f\left(t\right) \le 1$, $t \in \left[0,1\right]$ and $0 \le f\left(t\right) \le \frac{1}{2}$ for $t \in [1,2]$, then

   (1) $-\frac{3}{2} \le g\left(2\right) < \frac{1}{2}$

   (2) $\frac{1}{2} \le g\left(2\right) \le \frac{3}{2}$

   (3) $\frac{3}{2} < g\left(2\right) \le \frac{5}{2}$

   (4) $2 < g(2) < 4$

7. The value of $\underset{x \to 0}{Lt} \left\{ \frac{\int_0^{x^2} \sec^2\, t\, dt}{x\, \sin\, x} \right\}$ is

   (1) 0

   (2) 3

   (3) 2

   (4) 1

8. $\int\limits_{\sin x}^{1} t^2 f\left(t\right)\, dt = 1 - \sin\, x\, \forall\, x\, \in (0, \pi/2)$, then $f\left(\frac{1}{\sqrt{3}}\right)$ is :

9. $f(x) = \sin x + \int_0^x f'(t)\left(2\sin t - \sin^2 t\right)dt$, then $f(x)$ is

   (1) $\frac{\sin x}{1-\sin x}$

   (2) $\frac{1}{1-\sin x}$

   (3) $\frac{\sin x}{2-\sin x}$

   (4) $\frac{1}{\sin x}$

10. If $f(x) = \frac{1}{\pi} \int_0^{\frac{\pi}{2}} \frac{\sin^2 n\theta}{\sin^2 \theta}\, d\theta\, (n \in N)$, then the value of $\frac{f(15)+f(3)}{f(15)-f(a)}$