1. If $I_n=\int \sin^n x\,dx$, then $nI_n-(n-1)I_{n-2}$ equals

(1) $\left(\sin^{n-1}x\right)(\cos x)$
(2) $\left(\cos^{n-1}x\right)(\sin x)$
(3) $-\left(\sin^{n-1}x\right)(\cos x)$
(4) $-\left(\cos^{n-1}x\right)(\sin x)$

2. If the integral $\int \frac{bx\cos 4x-a\sin 4x}{x^2}dx=\frac{a\sin 4x}{x}+c$, then the values of a and b are:

(1) $a=1, b=4$
(2) $a=-1, b=4$
(3) $a=1, b=1/4$
(4) $a=1/4, b=2$

3. If $\int \sin^{-1}\left(\sqrt{\frac{x}{1+x}}\right)dx=A(x)\tan^{-1}(\sqrt{x})+B(x)+C$, where C is a constant of integration, then the ordered pair $(A(x)\ B(x))$ can be :

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

4. The value of $\int e^{\tan^{-1}x}\cdot\frac{(1+x+x^2)}{1+x^2}\,dx$ is

(1) $\tan^{-1}x+c$
(2) $e^{\tan^{-1}x}+c$
(3) $e^{\tan^{-1}x}-x+c$
(4) $xe^{\tan^{-1}x}+c$

5. $\int e^x\left[\frac{2+\sin 2x}{1+\cos 2x}\right]dx=$

(1) $e^x\tan x+C$
(2) $e^x+\tan x+C$
(3) $2e^x\tan x+C$
(4) $e^x\tan 2x+C$

6. $\int \frac{e^x(1+\sin x)}{1+\cos x}$ dx is equal to :

(1) $e^x\ \tan\left(\frac{x}{2}\right)+c$
(2) $e^x\ \tan\ x+c$
(3) $e^x\left(\frac{1+\sin x}{1-\cos x}\right)+c$
(4) $c-e^x\ \cot\left(\frac{x}{2}\right)$

7. Evaluate: $\int\left\{\frac{(\log x-1)}{1+(\log x)^2}\right\}^2dx$.

(1) $\frac{x}{x^2+2}+C$
(2) $\frac{\log x}{(\log x)^2+1}+C$
(3) $\frac{x}{(\log x)^2+1}+C$
(4) $\frac{xe^x}{1+x^2}+C$

8. Correct evaluation $\int\frac{x}{(x-2)(x-1)}dx$ is (where, P is an arbitrary constant)

(1) $\log_e\frac{(x-2)^2}{(x-1)}+P$
(2) $\log_e\frac{(x-1)}{(x-2)}+P$
(3) $\frac{x-1}{x-2}+P$
(4) $2\log_e\left(\frac{x-2}{x-1}\right)+P$

9. Indefinite integral $\int\frac{(x^2+1)}{(x^2+2)(x^2+3)}dx$ equals:

(1) $\tan^{-1}\left(\frac{x^2}{\sqrt{2}}\right)+\tan^{-1}\left(\frac{x^2}{\sqrt{3}}\right)$
(2) $\frac{1}{2}\tan^{-1}\left(\frac{x}{\sqrt{2}}\right)+\tan^{-1}\left(\frac{x}{\sqrt{3}}\right)$
(3) $-\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{x}{\sqrt{2}}\right)+\frac{2}{\sqrt{3}}\tan^{-1}\frac{x}{\sqrt{3}}$
(4) $\sqrt{2}\tan^{-1}\left(\frac{x}{\sqrt{2}}\right)+\tan^{-1}\left(\frac{x}{\sqrt{3}}\right)$

10. $\frac{x^2+1}{(2x-1)(x^2-1)}=$

(1) $\frac{-5}{3(2x-1)}+\frac{3}{(x+1)}+\frac{1}{(x-1)}$
(2) $\frac{-5}{3(2x-1)}+\frac{1}{3(x+1)}+\frac{1}{(x-1)}$
(3) $\frac{1}{2x-1}+\frac{5}{(x+1)}-\frac{3}{(x-1)}$
(4) None of these