Integration MCQs (Contd.)

Relevant Synopsis:

(1) **Extended u·v rule:** To integrate A·T & A·E, we use extended u·v rule.

eg. (i) $I = \int \underset{(u)}{x^2} \cdot \underset{(v)}{\cos x}\, dx$ (ILATE)

u	x^2	$2x$	2	← diff. conti. till you get constant
$\int v$	$\sin x$	$-\cos x$	$-\sin x$	← $\int v$ first & then integrate conti.

& the answer is product of the terms of each column with the sign of alternate product changed & add.

$\therefore I = (x^2)(\sin x) - (2x)(-\cos x) + (2)(-\sin x) + c$

$\therefore I = x^2 \sin x + 2x\cos x - 2\sin x + c$

(ii) $I = \int \underset{(u)}{x^3} \cdot \underset{(v)}{e^x}\, dx$ (ILATE)

u	x^3	$3x^2$	$6x$	6	← diff. till you get a constant
$\int v$	e^x	e^x	e^x	e^x	← $\int v$ first & conti. integrate

$\therefore I = (x^3)(e^x) - (3x^2)(e^x) + (6x)(e^x) - (6)(e^x) + c$

$\therefore I = e^x(x^3 - 3x^2 + 6x - 6) + c$

(2) **Standard results:**

(i) $\int x \cdot \cos x\, dx = x\sin x + \cos x + c$ (ii) $\int x \sin x\, dx = -x\cos x + \sin x + c$

(iii) $\int x \cdot e^x\, dx = e^x(x-1) + c$ (iv) $\int \log x\, dx = x(\log x - 1) + c$ or $x\log\left(\frac{x}{e}\right) + c$

(v) $\int \sin^{-1} x\, dx = x\sin^{-1} x + \sqrt{1-x^2} + c$ (vi) $\int \cos^{-1} x\, dx = x\cos^{-1} x - \sqrt{1-x^2} + c$

(vii) $\int \tan^{-1} x\, dx = x\tan^{-1} x - \frac{1}{2}\log|1+x^2| + c$

(viii) $\int \cot^{-1} x\, dx = x\cot^{-1} x + \frac{1}{2}\log|1+x^2| + c$ (ix) $\int x^x(1+\log x)\, dx = x^x + c$

(x) $\int [x \cdot f'(x) + f(x)]\, dx = x \cdot f(x) + c$

MCQs (classwork)

(84) $\int x^2 \cdot \log x \, dx =$

(a) $\frac{x^3}{9}(3\log x - 1) + c$ (b) $\frac{x^3}{3}(3\log x - 1) + c$ (c) $\frac{x^3}{9}(3\log x + 1) + c$ (d) $\frac{x^3}{9}(\log x - 1) + c$

(85) $\int x^2 \cdot \sin 3x \, dx =$

(a) $-\frac{x^2}{3}\cos 3x + \frac{2x}{9}\sin 3x - \frac{2}{27}\cos 3x + c$ (b) $\frac{x^2}{3}\cos 3x + \frac{2x}{9}\sin 3x + \frac{2}{27}\cos 3x + c$

(c) $-\frac{x^2}{3}\cos 3x + \frac{2x}{9}\sin 3x + \frac{2}{27}\cos 3x + c$ (d) $\frac{x^2}{3}\cos 3x - \frac{2x}{9}\sin 3x - \frac{2}{27}\cos 3x + c$

(86) $\int x \cdot \tan^{-1} x \, dx = k\left[x^2 \tan^{-1} x - x + \tan^{-1} x\right] + c$ then $k =$

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) 2

(87) $\int x^2 \cdot \tan^{-1} x \, dx = k\left[2x^3 \tan^{-1} x - x^2 + \log|1+x^2|\right] + c$ then $k =$

(a) $\frac{1}{6}$ (b) $-\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $-\frac{1}{3}$

(88) $\int x \cdot \sin^2 x \, dx = K\left[x^2 - x\sin 2x - \frac{1}{2}\cos 2x\right] + c$ then $k =$

(a) 4 (b) $\frac{1}{2}$ (c) $-\frac{1}{3}$ (d) $\frac{1}{4}$

(89) $\int x \cdot \sin 2x \cdot \cos 5x \, dx = A\, x\cos 7x + B\sin 7x + C\, x\cos 3x + D\sin 3x + c$

then $(A, B, C, D) =$

(a) $\left(-\frac{1}{14}, \frac{-1}{98}, \frac{1}{6}, \frac{1}{18}\right)$ (b) $\left(-\frac{1}{14}, \frac{1}{98}, \frac{-1}{18}, \frac{1}{6}\right)$ (c) $\left(-\frac{1}{14}, \frac{1}{98}, \frac{1}{6}, \frac{-1}{18}\right)$ (d) $\left(\frac{1}{14}, \frac{-1}{98}, \frac{-1}{6}, \frac{1}{18}\right)$

(90) $\int \frac{x \cdot \sin^{-1} x}{\sqrt{1-x^2}} \, dx =$

(a) $x - \sin^{-1} x \cdot \sqrt{1-x^2} + c$ (b) $x + \sin^{-1} x \cdot \sqrt{1-x^2} + c$

(c) $-x + \sin^{-1} x \sqrt{1-x^2} + c$ (d) $-x - \sin^{-1} x \sqrt{1-x^2} + c$

(91) $\int \cos\sqrt{x} \, dx = k\sqrt{x}\sin\sqrt{x} + \lambda\cos\sqrt{x} + c$ then $(k, \lambda) =$

(a) $(2, -2)$ (b) $(-2, 2)$ (c) $(2, 2)$ (d) $(-2, -2)$

(92) $\int x^x (1 + \log x) \, dx =$ (a) $x^x + c$ (b) $x^x \cdot \log x + c$ (c) $-x^x + c$

(d) $\frac{x^x}{x} + c$

(93) If $f(x) = \frac{\sin^{-1}x}{\sqrt{1-x^2}}$ & $g(x) = e^{\sin^{-1}x}$ then $\int f(x)\cdot g(x)\, dx =$

(a) $e^{\sin^{-1}x}(\sin^{-1}x - 1) + c$ (b) $e^{\sin^{-1}x}(1 - \sin^{-1}x) + c$

(c) $e^{\sin^{-1}x}(\sin^{-1}x + 1) + c$ (d) $e^{\sin^{-1}x}(-\sin^{-1}x - 1) + c$

(94) $\int \frac{\log(\log x)}{x}\, dx =$

(a) $\log x\,[\log(\log x) + 1] + c$ (b) $\log x\,[\log(\log x) - 1] + c$

(c) $\log x\,[1 - \log(\log x)] + c$ (d) $\log(\log x)\,[\log x - 1] + c$

(95) $\int (\log x)^2\, dx = x\cdot f(x) + c$ where $f(x) =$

(a) $(\log x)^2 + 2\log x + 2$ (b) $(\log x)^2 - 2\log x - 2$ (c) $(\log x)^2 - 2\log x + 2$ (d) $(\log x)^2 - 2\log x$

(96) $\int \sin\theta \cdot \log(\cos\theta)\, d\theta =$

(a) $\cos\theta\,[1 + \log(\cos\theta)] + c$ (b) $\cos\theta\,[\log(\cos\theta) - 1] + c$
(c) $\cos\theta\,[1 - \log(\cos\theta)] + c$ (d) $\cos\theta\,[1 - 2\log(\cos\theta)] + c$

(97) $\int \frac{x - \sin x}{1 - \cos x}\, dx = x\cdot g(x) + c$ then $g(x) =$

(a) $\cot\left(\frac{x}{2}\right)$ (b) $-\cot\left(\frac{x}{2}\right)$ (c) $\tan\left(\frac{x}{2}\right)$ (d) $-\frac{1}{2}\cot\left(\frac{x}{2}\right)$

(98) $\int \log(x^2+1)\, dx =$

(a) $x\log(1+x) - 2x + 2\tan^{-1}x + c$ (b) $\log(1+x^2) - 2x + 2\tan^{-1}x + c$
(c) $x\log(1+x^2) - x + 2\tan^{-1}x + c$ (d) $x\cdot\log(1+x^2) - 2x + 2\tan^{-1}x + c$

(99) $\int e^x\left(\frac{1+\sin x}{1+\cos x}\right) dx = e^x\cdot f(x) + c$ then $f(x) =$

(a) $\tan\left(\frac{x}{2}\right)$ (b) $-\tan\left(\frac{x}{2}\right)$ (c) $\frac{1}{2}\tan\left(\frac{x}{2}\right)$ (d) $\cot\left(\frac{x}{2}\right)$

(100) $\int \frac{e^x}{x}\left[x(\log x)^2 + 2\log x\right] dx = e^x\cdot f(x) + c$ then $f(x) =$

(a) $\log x$ (b) $(\log x)^2$ (c) $\frac{2\log x}{x}$ (d) $-(\log x)^2$

Extra Synopsis:

(1) $\int \frac{xe^x}{(x+a)^{a+1}}\,dx = \frac{e^x}{(x+a)^a} + c$ eg $\int \frac{xe^x}{(x+2)^3}\,dx = \frac{e^x}{(x+2)^2} + c$

(2) To integrate $f(\log x)$, put $\boxed{\log x = t}$ $\boxed{\therefore x = e^t}$ $\boxed{\therefore dx = e^t\,dt}$

(3) $\int e^{ax}\cos bx\,dx = \frac{e^{ax}}{a^2+b^2}(a\cos bx + b\sin bx) + c$

(4) $\int e^{ax}\sin bx\,dx = \frac{e^{ax}}{a^2+b^2}(a\sin bx - b\cos bx) + c$

(5) $\int \sec^3\theta\,d\theta = \frac{1}{2}\left[\frac{d}{d\theta}\sec\theta + \int \sec\theta\,d\theta\right] + c$

(6) $\int \operatorname{cosec}^3\theta\,d\theta = \frac{1}{2}\left[\frac{d}{d\theta}\operatorname{cosec}\theta + \int \operatorname{cosec}\theta\,d\theta\right] + c$

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(101) $\int \frac{xe^x}{(x+1)^2}\,dx =$ (a) $\frac{e^x}{x+1}+c$ (b) $-\frac{e^x}{x+1}+c$ (c) $\frac{e^x}{(x+1)^2}+c$ (d) $\frac{xe^x}{x+1}+c$

(102) $\int \frac{e^x(x+3)}{(x+4)^2}\,dx =$

(a) $\frac{e^x}{(x+4)^2}+c$ (b) $-\frac{e^x}{x+4}+c$ (c) $\frac{e^x}{x+4}+c$ (d) $\frac{xe^x}{x+4}+c$

(103) $\int e^{5x}\left(\frac{5x\log x+1}{x}\right)dx =$

(a) $e^x.\log x+c$ (b) $e^{5x}.\log x+c$ (c) $e^{5x}\log\left(\frac{x}{5}\right)+c$ (d) $-e^{5x}\cdot\log x+c$

(104) $\int e^{\sin^{-1}x}\left[\frac{x+\sqrt{1-x^2}}{\sqrt{1-x^2}}\right]dx =$

(a) $e^{\sin^{-1}x}\cdot\sin^{-1}x+c$ (b) $e^x.\sin^{-1}x+c$ (c) $x\cdot e^{\sin^{-1}x}+c$ (d) $-x\cdot e^{\sin^{-1}x}+c$

(105) $\int \frac{\log x}{(\log ex)^2} dx =$

(a) $\frac{x}{1+\log x}+c$ (b) $\frac{-x}{1+\log x}+c$ (c) $\frac{1}{1+\log x}+c$ (d) $-\frac{1}{1+\log x}+c$

(106) $\int \left[\log(\log x) + (\log x)^{-2}\right] dx = x.f(x)+c$ then $f(x)=$

(a) $\log(\log x)+\frac{1}{\log x}$ (b) $\log(\log x)-\frac{1}{\log x}$ (c) $\frac{1}{\log x}-\log(\log x)$ (d) $\log(\log x)+\frac{1}{(\log x)^2}$

(107) $\int \left[\sin(\log x)+\cos(\log x)\right] dx =$

(a) $x\cdot\cos(\log x)+c$ (b) $-x\cdot\sin(\log x)+c$ (c) $x\cdot\sin(\log x)+c$ (d) $\sin(\log x)+c$

(108) $\int e^{2x}\cos 3x \, dx = \frac{e^{2x}}{\lambda}(k\cos 3x+\mu\sin 3x)+c$ then $(\lambda, k, \mu)=$

(a) $(13, 2, 3)$ (b) $(13, 3, 2)$ (c) $(13, 2, -3)$ (d) $(13, -2, 3)$

(109) $\int e^{3x}\sin 4x \, dx = \frac{e^{3x}}{\lambda}(3\sin 4x-4\cos 4x)+c$ then $\lambda =$

(a) 5 (b) 25 (c) $\frac{1}{25}$ (d) $\frac{1}{5}$

(110) $\int \sin(\log x)\, dx = f(x)\left[\sin(\log x)-\cos(\log x)\right]+c$ then $f(x)=$

(a) x (b) $-x$ (c) $\frac{x}{2}$ (d) $-\frac{x}{2}$

(111) $\int \sec^3 x \, dx = k\left[\sec x\tan x+\log|\sec x+\tan x|\right]+c$ then $k=$

(a) 2 (b) -2 (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

(112) $\int \sqrt{5x^2+3}\, dx = k\left[\frac{x}{2}\sqrt{x^2+\frac{3}{5}}+\frac{3}{10}\log\left|x+\sqrt{x^2+\frac{3}{5}}\right|\right]+c$ then $k=$

(a) $\sqrt{5}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{1}{5}$ (d) 5

(113) $\int x^2\sqrt{a^2-x^6}\, dx = k\left[x^3\sqrt{a^2-x^6}+a^2\sin^{-1}\left(\frac{x^3}{a}\right)\right]+c$ then $k=$

(a) 6 (b) -6 (c) $\frac{1}{6}$ (d) $\frac{1}{3}$

(114) $\int \sqrt{4^x(4^x+4)}\,dx = k\left[\frac{2^x}{2}\sqrt{4^x+4} + 2\log\left|2^x+\sqrt{4^x+4}\right|\right]+c$ then $k=$

(a) $\log 2$ (b) $\frac{1}{\log 2}$ (c) $2\log 2$ (d) $\frac{1}{\log 4}$

(115) $\int x\cdot\sin^{-1}x\,dx = k\,x^2\sin^{-1}x + \lambda x\sqrt{1-x^2} + \mu\sin^{-1}x + c$ then $(k,\lambda,\mu) =$

(a) $\left(\frac{1}{2},\frac{1}{4},\frac{1}{4}\right)$ (b) $\left(-\frac{1}{2},\frac{1}{4},\frac{1}{4}\right)$ (c) $\left(\frac{1}{2},\frac{1}{4},-\frac{1}{4}\right)$ (d) $\left(\frac{1}{2},-\frac{1}{4},-\frac{1}{4}\right)$

(116) $\int \sqrt{(x-3)(7-x)}\,dx = \frac{x-5}{2}\sqrt{(x-3)(7-x)} + 2f(x) + c$ then $f(x) =$

(a) $\sin^{-1}(x-5)$ (b) $\sin^{-1}\left(\frac{x-5}{2}\right)$ (c) $\sin^{-1}\left(\frac{x-5}{4}\right)$ (d) $\sin^{-1}\left(\frac{x+5}{2}\right)$

(117) $\int \sqrt{2x^2+3x+4}\,dx = \frac{4x+3}{k}\sqrt{x^2+\frac{3}{2}x+2} + \lambda\log\left|x+\frac{3}{4}+\sqrt{x^2+\frac{3}{2}x+2}\right|+c$

then $(k,\lambda) =$ (a) $\left(\frac{1}{4\sqrt{2}},\frac{23}{16\sqrt{2}}\right)$ (b) $\left(\frac{1}{4\sqrt{2}},\frac{-23}{16\sqrt{2}}\right)$ (c) $\left(\frac{1}{4},\frac{23}{16}\right)$ (d) $\left(-\frac{1}{4},\frac{-23}{16}\right)$

(118) $\int \sec^2x\sqrt{\tan^2x+\tan x-7}\,dx = \frac{2\tan x+1}{4}\sqrt{\tan^2x+\tan x-7}$

$+ \lambda\log\left|\tan x+\frac{1}{2}+\sqrt{\tan^2x+\tan x-7}\right| + c$

then $\lambda =$ (a) $\frac{29}{8}$ (b) $-\frac{29}{16}$ (c) $\frac{29}{16}$ (d) $-\frac{29}{8}$

(119) $\int \tan^{-1}\sqrt{\frac{1-x}{1+x}}\,dx =$

(a) $\frac{1}{2}\left[\cos^{-1}x - \sqrt{1-x^2}\right]+c$ (b) $\frac{1}{2}\left[x\cos^{-1}x - \sqrt{1-x^2}\right]+c$

(c) $\frac{1}{2}\left[x\sin^{-1}x - \sqrt{1-x^2}\right]+c$ (d) $x\cos^{-1}x - \sqrt{1-x^2}+c$

(120) $\int \tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)dx =$

(a) $x\sin^{-1}x + \sqrt{1-x^2}+c$ (b) $x\sin^{-1}x - \sqrt{1-x^2}+c$

(c) $-x\sin^{-1}x + \sqrt{1-x^2}+c$ (d) $x\cos^{-1}x - \sqrt{1-x^2}+c$

(121) $\int \tan^{-1}\left(\frac{2x}{1-x^2}\right)dx = k\,x\tan^{-1}x + \lambda\log|1+x^2| + c$ then $(k,\lambda) =$

(a) $(2,1)$ (b) $(-2,1)$ (c) $(2,-1)$ (d) $(1,-2)$

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Home Work MCQS (Contd.)

(78) $\int x \cdot \sin 2x \, dx =$

(a) $\frac{\sin 2x}{4} - \frac{x \sin 2x}{2} + c$ (b) $\frac{\sin 2x}{4} - \frac{x \cos 2x}{2} + c$

(c) $\frac{\cos 2x}{4} + \frac{x \sin 2x}{2} + c$ (d) $-\frac{\sin 2x}{4} - \frac{x \cos 2x}{2} + c$

(79) $\int x \cdot \tan^2 x \, dx =$

(a) $x \tan x + \log|\sec x| + \frac{x^2}{2} + c$ (b) $x \tan x + \log|\sec x| - \frac{x^2}{2} + c$

(c) $x \tan x - \log|\sec x| - \frac{x^2}{2} + c$ (d) $x \tan x - \log|\sec x| + \frac{x^2}{2} + c$

(80) $\int x^2 \cdot \sin x \, dx =$ (a) $(x^2-2)\cos x + 2x\sin x + c$ (b) $(x^2-2)\cos x - 2x\sin x + c$ (c) $(2-x^2)\cos x + 2x\sin x + c$ (d) $(2-x^2)\cos x - 2x\sin x + c$

(81) $\int \frac{x}{1-\cos x} \, dx =$

(a) $x\cot\left(\frac{x}{2}\right) + 2\log\left|\sin\frac{x}{2}\right| + c$ (b) $x\cot\left(\frac{x}{2}\right) - 2\log\left|\sin\frac{x}{2}\right| + c$

(c) $-x\cot\left(\frac{x}{2}\right) + 2\log\left|\sin\frac{x}{2}\right| + c$ (d) $-x\cot\left(\frac{x}{2}\right) - 2\log\left|\sin\frac{x}{2}\right| + c$

(82) $\int x^3 \cdot \log x \, dx =$

(a) $\frac{x^4}{4}\log x - \frac{x^4}{16} + c$ (b) $\frac{x^4}{4}\log x - \frac{x^4}{8} + c$

(c) $\frac{x^4}{2}\log x - \frac{x^4}{16} + c$ (d) $\frac{x^4}{4}\log x + \frac{x^4}{16} + c$

(83) $\int x^3 \cdot \tan^{-1} x \, dx = k\,(x^4-1)\tan^{-1} x + \lambda\,(x^3 - 3x) + c$ then $(k, \lambda) =$

(a) $(4, 12)$ (b) $\left(\frac{1}{4}, \frac{1}{12}\right)$ (c) $(4, -12)$ (d) $\left(\frac{1}{4}, -\frac{1}{12}\right)$

(84) $\int x \cdot \cos^3 x \, dx = k\left(3x\sin x + \frac{x}{3}\sin 3x + 3\cos x + \frac{\cos 3x}{9}\right) + c$ then $k =$

(a) 4 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) 2

(85) $\int \frac{\log x}{x^3} \, dx =$

(a) $\frac{1}{4x^2}(2\log x - 1) + c$ (b) $-\frac{1}{4x^2}(2\log x + 1) + c$ (c) $\frac{1}{4x^2}(2\log x + 1) + c$ (d) $\frac{1}{4x^2}(1 - 2\log x) + c$

(86) $\int e^{\sqrt{x}}\,dx =$ (a) $2e^{\sqrt{x}}(\sqrt{x}-1)+c$ (b) $2e^{\sqrt{x}}(\sqrt{x}+1)+c$ (c) $e^{\sqrt{x}}(\sqrt{x}-1)+c$ (d) $e^{\sqrt{x}}(\sqrt{x}+1)+c$

(87) $\int x^3 \cdot e^{x^2}\,dx = k\cdot e^{x^2}(x^2-1)+c$ then $k =$

(a) 2 (b) $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) -2

(88) $\int e^{\cos x}\cdot \sin 2x\,dx =$ (a) $2e^{\cos x}(\cos x-1)+c$ (b) $e^{\cos x}(1-\cos x)+c$ (c) $2e^{\cos x}(1-\cos x)+c$ (d) $e^{\cos x}(\cos x-1)+c$

(89) $\int \tan^{-1}\sqrt{x}\,dx =$

(a) $x+\tan^{-1}\sqrt{x}+\sqrt{x}+c$ (b) $x+\tan^{-1}\sqrt{x}-\sqrt{x}+c$
(c) $(x+1)\tan^{-1}\sqrt{x}+\sqrt{x}+c$ (d) $(x+1)\tan^{-1}\sqrt{x}-\sqrt{x}+c$

(90) $\int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx = Kx\tan^{-1}x+\lambda\log|1+x^2|+c$ then $(K,\lambda) =$

(a) $(2,-1)$ (b) $(2,1)$ (c) $(1,2)$ (d) $(1,-2)$

(91) $\int \left[\log(1+\cos x) - x\tan\frac{x}{2}\right]dx = x\cdot f(x)+c$ then $f(x) =$

(a) $\tan\frac{x}{2}$ (b) $-\tan\frac{x}{2}$ (c) $\log(1+\cos x)$ (d) $-\log(1+\cos x)$

(92) $\int \log(1+x)^{1+x}\,dx =$

(a) $(1+x)^2\left[\log(1+x)-\frac{1}{2}\right]+c$ (b) $\frac{(1+x)^2}{2}\left[\log(1+x)-\frac{1}{2}\right]+c$

(c) $\frac{(1+x)^2}{2}\left[\log(1+x)+\frac{1}{2}\right]+c$ (d) $(1+x)^2\left[\log(1+x)+\frac{1}{2}\right]+c$

(93) $\int e^x(\cot x-1-\cot^2 x)\,dx =$ (a) $e^x\cot x+c$ (b) $-e^x\cot x+c$ (c) $e^x\cot^2 x+c$ (d) $-e^x\cot^2 x+c$

(94) $\int e^x\left(\frac{2+\sin 2x}{1+\cos 2x}\right)dx =$ (a) $e^x\cot x+c$ (b) $e^x\tan x+c$ (c) $-e^x\tan x+c$ (d) $-e^x\cot x+c$

(95) $\int e^x\left(\frac{\sqrt{1-x^2}\,\sin^{-1}x+1}{\sqrt{1-x^2}}\right)dx =$

(a) $e^x\sqrt{1-x^2}+c$ (b) $-e^x\sin^{-1}x+c$ (c) $e^x\sin^{-1}x+c$ (d) $\frac{e^x}{\sqrt{1-x^2}}+c$

(96) $\int \frac{xe^x}{(x+2)^3}\,dx =$

(a) $-\frac{e^x}{x+2}+c$ (b) $\frac{e^x}{x+2}+c$ (c) $-\frac{e^x}{(x+2)^2}+c$ (d) $\frac{e^x}{(x+2)^2}+c$

(97) $\int e^x\left[\frac{x-1}{(x+1)^3}\right]dx = e^x \cdot f(x)+c$ then $f(x)=$

(a) $-\frac{1}{x+1}$ (b) $\frac{1}{x+1}$ (c) $-\frac{1}{(x+1)^2}$ (d) $\frac{1}{(x+1)^2}+c$

(98) $\int e^x\left[\frac{x^2+1}{(x+1)^2}\right]dx = e^x \cdot f(x)+c$ then $f(x)=$ (a) $\frac{x-1}{x+1}$ (b) $\frac{x}{x+1}$ (c) $\frac{x-1}{(x+1)^2}$ (d) $\frac{1}{x+1}$

(99) $\int e^x\left(\frac{x+2}{x+4}\right)^2 dx = e^x \cdot f(x)+c$ then $f(x)=$

(a) $\frac{x+2}{x+4}$ (b) $\frac{x-2}{x+4}$ (c) $\frac{x}{x+4}$ (d) $\frac{2x}{x+4}$

(100) $\int e^{3x}\left(\log 2x+\frac{1}{3x}\right)dx =$

(a) $\frac{e^{3x}}{3}\log 2x+c$ (b) $\frac{e^{3x}}{2}\log 2x+c$ (c) $3e^{3x}\log 2x+c$ (d) $e^{3x}\log 2x+c$

(101) $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx = f(x)\cdot e^{\tan^{-1}x}+c$ then $f(x)=$

(a) x^2 (b) $-x$ (c) x (d) $\frac{1}{x}$

(102) $\int\left[\frac{1}{\log x}-\frac{1}{(\log x)^2}\right]dx =$

(a) $\frac{1}{\log x}$ (b) $-\frac{1}{\log x}$ (c) $-\frac{x}{\log x}$ (d) $\frac{x}{\log x}$

(103) $\int \operatorname{cosec}(\log x)\left[1-\cot(\log x)\right]dx =$

(a) $x\cdot\operatorname{cosec}(\log x)+c$ (b) $x\cot(\log x)+c$
(c) $-x\operatorname{cosec}(\log x)+c$ (d) $-x\cot(\log x)+c$

(104) $\int e^{5x}\cos 12x\,dx = \frac{e^{5x}}{k}(l\cos 12x+m\sin 12x)+c$ then $(k, l, m)=$

(a) $(169, 5, -12)$ (b) $(169, -5, 12)$ (c) $(169, 5, 12)$ (d) $(13, 5, 12)$

(105) $\int e^{2x}\sin x\cos x\,dx = \frac{e^{2x}}{k}(\sin 2x-\cos 2x)+c$ then $k=$

(a) 4 (b) 8 (c) $\frac{1}{8}$ (d) 16

(106) $\int \cos(\log x)\,dx = \frac{f(x)}{2}\left[\cos(\log x)+\sin(\log x)\right]+c$ then $f(x)=$

(a) x^2 (b) $-x^2$ (c) $-x$ (d) x

(107) $\int \sqrt{4x^2-25}\,dx = x\sqrt{x^2-\frac{25}{4}} + k\log\left|x+\sqrt{x^2-\frac{25}{4}}\right|+c$ then $k=$

(a) $\frac{25}{8}$ (b) $-\frac{25}{16}$ (c) $-\frac{25}{4}$ (d) $\frac{25}{16}$

(108) $\int \cos x\sqrt{36-\sin^2 x}\,dx = \frac{\sin x}{2}\sqrt{36-\sin^2 x} + k\sin^{-1}\left(\frac{\sin x}{6}\right)+c$ then $k=$

(a) 12 (b) 18 (c) -18 (d) 6

(109) $\int \sqrt{2ax-x^2}\,dx = \frac{x-a}{2}\sqrt{f(x)} + \frac{a^2}{2}\sin^{-1} g(x)+c$ then $f(x)$ & $g(x)$ are resp.

(a) $2ax-x^2$ & $\frac{x-a}{a}$ (b) x^2-2ax & $\frac{x-a}{a}$

(c) $2ax-x^2$ & $\frac{x+a}{a}$ (d) x^2-2ax & $\frac{x+a}{a}$

(110) $\int \sqrt{(x-3)(5-x)}\,dx = \frac{x-4}{2}\sqrt{8x-x^2-15} + \frac{1}{2}\sin^{-1}[f(x)]+c$ then $f(x)=$

(a) $x+4$ (b) $\frac{x+4}{2}$ (c) $\frac{x-4}{2}$ (d) $x-4$

(111) $\int \sqrt{x^2-4x-5}\,dx = \frac{f(x)}{2}\sqrt{x^2-4x-5} + k\log\left|x-2+\sqrt{x^2-4x-5}\right|+c$

then $f(x)$ & k are resp.

(a) $x-2$ & $\frac{9}{2}$ (b) $x-2$ & $-\frac{9}{2}$ (c) $x-4$ & $\frac{9}{2}$ (d) $x-2$ & -9

(112) $\int \frac{\sqrt{(\log x)^2+3\log x+1}}{x}\,dx = \frac{2\log x+3}{4}\sqrt{(\log x)^2+3\log x+1}$

$+k\log\left|\log x+\frac{3}{2}+\sqrt{(\log x)^2+3\log x+1}\right|+c$

then $k=$ (a) $-\frac{5}{4}$ (b) $\frac{5}{8}$ (c) $-\frac{5}{8}$ (d) $\frac{5}{8}$

— X —

ANSWERS (HOMEWORK)

(1) c (2) a (3) b (4) a (5) d (6) b (7) d (8) c (9) c (10) a
(11) d (12) b (13) c (14) b (15) c (16) a (17) d (18) a (19) c (20) d
(21) a (22) b (23) a (24) c (25) d (26) b (27) b (28) b (29) c (30) b
(31) c (32) d (33) c (34) a (35) c (36) a (37) b (38) d (39) b (40) d
(41) a (42) a (43) d (44) b (45) c (46) d (47) a (48) c (49) b (50) a
(51) c (52) b (53) a (54) b (55) c (56) d (57) a (58) b (59) c (60) a
(61) b (62) a (63) c (64) c (65) a (66) d (67) b (68) b (69) c (70) a
(71) c (72) a (73) b (74) d (75) d (76) c (77) b (78) b (79) c (80) c
(81) c (82) a (83) d (84) b (85) b (86) a (87) c (88) c (89) d (90) a
(91) c (92) b (93) a (94) b (95) c (96) d (97) d (98) a (99) c (100) a
(101) c (102) d (103) a (104) c (105) b (106) d (107) c (108) b (109) a (110) d
(111) b (112) c