Group 1

1. $\int \cos x \, (1 + \sin^2 x) \, dx$

$\cancel{\int \cos x}$ $u = \sin x$ $du = \cos x$

$\int (1 + u^2) \, du$

$= u + \frac{1}{3}u^3 = \sin x + \frac{1}{3}\sin^3 x + C$ ✓

correct KRG

7.5 Group 1 #2

2. $\int_0^1 (3x+1)^{\sqrt{2}}\,dx = \frac{1}{3}\int_0^1 u^{\sqrt{2}}\,du$

$u=3x+1$

$\frac{1}{3}du=dx$

$= \frac{1}{3}\left[\frac{1}{\sqrt{2}+1}\cdot u^{\sqrt{2}+1}\right]_0^1$

$= \frac{1}{3}\left[\frac{1}{\sqrt{2}+1}\cdot (3x+1)^{\sqrt{2}+1}\right]_0^1$

$= \frac{1}{3}\left[\frac{1}{\sqrt{2}+1}\cdot 4^{\sqrt{2}+1} - \left(\frac{1}{\sqrt{2}+1}\right)\right]$ ✓

correct

KRG

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Group 1

3. $\int \frac{\sin x + \sec x}{\tan x}\,dx$

$= \int \frac{\sin x}{\tan x}\,dx + \int \frac{\sec x}{\tan x}$

$= \int \sin x \cot x\,dx + \int \sec x \cot x\,dx$

$= \int \cancel{\sin x}\,\frac{\cos x}{\cancel{\sin x}}\,dx + \int \sec x \cdot \frac{\cos x}{\sin x}\,dx$

$= \int \cos x\,dx$

$= \sin x + C$

$= \int \frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{\sin x}\,dx$

$= \int \frac{1}{\sin x}\,dx$

$= \int \csc x\,dx$

$= \ln|\csc x - \cot x| + C$

$\boxed{= \sin x + \ln|\csc x - \cot x| + C}$ ✓

Correct
KRG

Group 1

4. $\int \frac{\sin^3 x}{\cos x}\, dx$

$\int \tan x \sin^2 x \, dx$

$\int \tan x (1-\cos^2 x)\, dx$

$\int \tan x - \tan x \cos^2 x \, dx$

$\int \tan x - \frac{\sin x}{\cos x} \cdot \cos^2 x \, dx$

$\int \tan x - \frac{1}{2}\sin 2x \, dx$

$= \ln|\sec x| + \frac{1}{4}\cos 2x + C$ ✓

Correct ~~KG~~ KRG

I would have done it another way

$\int \frac{\sin^2 x}{\cos x} \sin x \, dx = \int \frac{1-\cos^2 x}{\cos} \sin x \, dx$

$u = \cos x$
$du = -\sin x \, dx$
$-du = \sin x \, dx$

$= \int \frac{1-u^2}{u}(-du)$

$= \int \left(u - \frac{1}{u}\right) du = \frac{1}{2}u^2 - \ln|u| + C$

$= \frac{1}{2}\cos^2 x - \ln|\cos x| + C$

(Note your answer is equal to mine:
i.e. $-\ln|\cos x| = \ln\left|\frac{1}{\cos x}\right| = \ln|\sec x|$
$\frac{1}{2}\cos^2 x = \frac{1}{2}\left(\frac{1+\cos 2x}{2}\right) = \frac{1}{4} + \frac{\cos 2x}{4}$ part of the constant

Group 1

29. $\int \ln(x+\sqrt{x^2-1})\,dx$ $\qquad \int u\,dv = uv - \int v\,du$

$u = \ln(\sqrt{x^2-1}+x)$ $\qquad du = \frac{\frac{1}{2}(x^2-1)^{-1/2}\,2x+1}{\sqrt{x^2-1}+x}\,dx$

$(x^2-1)^{1/2}+x$

No $\quad du = \frac{\cancel{2x}+1}{(\sqrt{x^2-1})(\sqrt{x^2-1}+x)}$

error

$v = x$ yes $\qquad dv = dx$

"du not correct"

show more work here

$x\ln(\sqrt{x^2-1}+x) - \frac{1}{2}\int \frac{1}{\sqrt{m}}\,dm$ $\qquad m = x^2-1$

$= x\ln(\sqrt{x^2-1}+x) - \sqrt{m}$

$= x\ln(\sqrt{x^2-1}+x) - \sqrt{x^2-1}$ right answer but error in du

$du = \frac{1}{x+\sqrt{x^2+1}}\left(1+\frac{x}{\sqrt{x^2-1}}\right)dx$

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

$\therefore\; uv - \int v\,du$

$= x\ln(\sqrt{x^2-1}+x) - \int \frac{x}{\sqrt{x^2-1}}\,dx$

$= x\ln(\sqrt{x^2-1}+x) - \frac{1}{2}\int \frac{2x}{\sqrt{x^2-1}}\,dx$

$= x\ln(\sqrt{x^2-1}+x) - \sqrt{x^2-1} + C$

KRG

#30

Group 1

$$\int_{-1}^{2} |e^x - 1|\,dx \qquad f(x) = e^x - 1 = 0 \quad @\ x = 0$$

$f(x)$: $-$ | $+$ (at 0)

$$\int_{-1}^{0} (1 - e^x)\,dx + \int_{0}^{2} (e^x - 1)\,dx$$

$$\left[x - e^x\right]_{-1}^{0} + \left[e^x - x\right]_{0}^{2}$$

$$0 - 1 - \left(-1 - \tfrac{1}{e}\right) + \left(e^2 - 2\right) - 1$$

$$\boxed{\tfrac{1}{e} + e^2 - 3} \checkmark$$

correct

KRG

Group I

31. $\int \sqrt{\frac{1+x}{1-x}}\,dx$

$= \int \frac{\sqrt{1+x}}{\sqrt{1-x}}\,dx \cdot \frac{\sqrt{1+x}}{\sqrt{1+x}} = \int \frac{1+x}{\sqrt{1-x^2}}\,dx$

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

$x = \sin\theta$

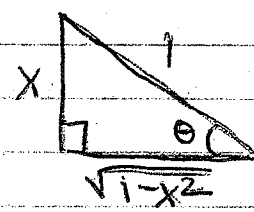
$\sqrt{1-x^2} = \sqrt{1-\sin^2\theta} = \sqrt{\cos^2\theta}$

$dx/d\theta = \cos\theta$

$dx = \cos\theta\,d\theta$

$= \arcsin x$

$= \int \frac{\sin\theta}{\cancel{\cos\theta}}\,\cancel{\cos\theta}\,d\theta = \int \sin\theta\,d\theta$



$\sin\theta = \frac{x}{1}$

$\cos\theta = \frac{\sqrt{1-x^2}}{1}$

$= -\cos\theta + C$

$= \arcsin x - \cos\theta + C$

$\boxed{= \arcsin x - \sqrt{1-x^2} + C}$

correct KRG

but a quicker approach to

$\int \frac{x}{\sqrt{1-x^2}}\,dx$ is $= -\frac{1}{2}\int \frac{-2x}{\sqrt{1-x^2}}\,dx$

Let $w = 1-x^2$

$dw = -2x\,dx$

$= -\frac{1}{2}\int \frac{1}{w^{\frac{1}{2}}}\,dw$

$= -w^{\frac{1}{2}} + C$

$= -\sqrt{1-x^2} + C$

Group 1

57. $\int x^3\sqrt{x+c}\,dx$ $\quad u = x+c \quad du = 1$

$\sqrt[3]{u} = u^{\frac{1}{3}}$

$\int (u-c)\,u^{\frac{1}{3}}\,du$

$\int u^{\frac{4}{3}} - cu^{\frac{1}{3}}$

$\frac{1}{1+4/3}\,u^{7/3} - \frac{1}{4/3}\,u^{4/3}c$

$\frac{3}{7}u^{7/3} - \frac{3}{4}u^{4/3}c$

$= \frac{3}{7}(x+c)^{7/3} - \frac{4}{3}(x+3)^{4/3}c + K$ ← use different letter for the constant since c is already in use

Also this should be 3/4 not $\frac{4}{3}$.

Otherwise correct. KR

Note: You could have also used

$u = (x+c)^{\frac{1}{3}}$

$u^3 - c = x$

$dx = 3u^2\,du$

$\therefore \int x(x+c)^{\frac{1}{3}}dx = \int (u^3-c)\,u\;3u^2\,du$

$= 3\int (u^6 - cu^3)\,du$

$= 3\left(\frac{u^7}{7} - \frac{cu^4}{4}\right) + K$

$= 3\left(\frac{(x+c)^{7/3}}{7} - c\,\frac{(x+c)^{4/3}}{4}\right) + K$

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group 1

59. $\int \cos x \cos^3(\sin x)\, dx$ $\qquad u = \sin x$

$\frac{du}{dx} = \cos x$

$du = \cos x\, dx$

$\int \cos^3(u)\, du$

$= \int \cos^2 u \cdot \cos u\, du$

$= \int (1-\sin^2 u) \cos u\, du$ $\qquad w = \sin u$

$dw = \cos u\, du$

$= \int (1-w^2)\, dw$

$= w - \frac{1}{3} w^3 + C$

$= \sin u - \frac{1}{3}\sin^3 u + C$

$\boxed{= \sin(\sin x) - \frac{1}{3}\sin^3(\sin x) + C}$

Correct KRG

need to add dx

10. $\int \frac{dx}{x^2\sqrt{4x^2-1}} = \int \frac{1}{x^2\sqrt{4x^2-1}}\,dx$

$2x = \sec\theta$

$x = \frac{1}{2}\sec\theta$

$dx/d\theta = \frac{1}{2}\sec\theta\tan\theta$

$dx = \frac{1}{2}\sec\theta\tan\theta\,d\theta$

$\theta = \sec^{-1}(2x)$

$= \int \frac{1}{\frac{1}{4}\sec^2\theta\sqrt{\sec^2\theta-1}}\,\frac{1}{2}\sec\theta\tan\theta\,d\theta$

$= \cancel{\int \frac{1}{\frac{1}{2}\sec\theta\tan\theta}}$

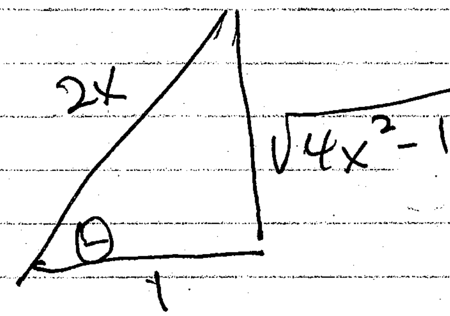
$= \int$ then

$= \int \frac{\frac{1}{2}\sec\theta\tan\theta\,d\theta}{\frac{1}{4}\sec^2\theta\sqrt{\sec^2\theta-1}}$

$= \int \frac{2\tan\theta}{\sec\theta\tan\theta}\,d\theta$

$= 2\int\cos\theta\,d\theta$

$= 2\sin\theta + C$



$= 2\,\frac{\sqrt{4x^2-1}}{2x} + C$

$= \boxed{\frac{\sqrt{4x^2-1}}{x} + C}$ final answer