MAT 221 011 Smr 08 Quiz 1 Name: SOL

Please show your work to receive credit. For integrals you must show all your steps carefully. Point values are in parentheses.

(5 ea.) 1. Carefully work out each of these integrals, For integration by parts, be sure to clearly indicate what you are using for u, u', v, v', at each stage. For substitutions clearly indicate what you are using for u, etc.

a) $\int_0^2 xe^{3x}dx = \frac{1}{3}xe^{3x}\Big|_0^2 - \int_0^2 \frac{1}{3}e^{3x}dx = \frac{2}{3}e^6 - 0 - \frac{1}{3}\left(\frac{1}{3}e^{3x}\right)\Big|_0^2 = \frac{2}{3}e^6 - \frac{1}{9}e^6 + = \frac{5}{9}e^6 + \frac{1}{9}$

$u = x \quad v = \frac{1}{3}e^{3x}$

$u' = 1 \quad v' = e^{3x}$

b) $\int \cos x \ln(\sin x)\,dx = \sin x \ln(\sin x) - \int \frac{\cos x}{\sin x}\sin x\,dx = \sin x \ln(\sin x) - \int \cos x\,dx$

$u = \ln(\sin x) \quad v = \sin x$

$u' = \frac{\cos x}{\sin x} \quad v' = \cos x$

$= \sin x \ln(\sin x) - \sin x + C$

c) $\int \cos^2 x \sin^5 x\,dx = \int \cos^2 x \sin^4 x \sin x\,dx = \int \cos^2 x \left(1-\cos^2 x\right)^2 \sin x\,dx = -\int u^2\left(1-u^2\right)^2\,du$

$u = \cos x$

$du = -\sin x\,dx$

$= -\int u^2\left(1-2u^2+u^4\right)du = -\int u^2 - 2u^4 + u^6\,du = -\frac{u^3}{3} + \frac{2u^5}{5} - \frac{u^7}{7} + C$

$= -\frac{1}{3}\cos^3 x + \frac{2}{5}\cos^5 x - \frac{1}{7}\cos^7 x + C$

d) $\int \tan^3 x \sec^5 x\,dx = \int \tan^2 x \sec^4 x \sec x \tan x\,dx = \int \left(\sec^2 x - 1\right)\sec^4 x \sec x \tan x\,dx$

$u = \sec x$

$du = \sec x \tan x\,dx$

$= \int \left(u^2-1\right)u^4\,du = \int u^6 - u^4 du = \frac{1}{7}u^7 - \frac{1}{5}u^5 + C = \frac{1}{7}\sec^7 x - \frac{1}{5}\sec^5 x + C$