IYAMU UCHENNA PRECIOUS

MECHANICAL ENGINEERING

SN 28

MAT104

$A \sec^2 u \, du$

$\frac{4}{3} \tan u + c$

$\frac{4}{3} \tan \left(3u+1\right) + c$

(4) $\int 2t \left(3t^2-1\right)^{\frac{1}{2}} dt$

$u = \sqrt{3t^2-1} \; ; \; u^2 = 3t^2-1 \; ; \; 3t^2 = u^2+1 \; , \; t^2 = \frac{u^2+1}{3}$

$t = \sqrt{\frac{u^2+1}{3}}$

$\frac{dt}{du} = \frac{1}{2} \left(\frac{3u^2+1}{3}\right)^{-\frac{1}{2}} \cdot \frac{2u}{3}$

$\frac{dt}{du} = \frac{u}{3} \left(\frac{u^2+1}{3}\right)^{-\frac{1}{2}}$

$dt = \frac{u \, du}{3} \left(\frac{u^2+1}{3}\right)^{-\frac{1}{2}}$

$\int 2 \left(\frac{u^2+1}{3}\right)^{\frac{1}{2}} \cdot u \cdot \frac{du}{3} \left(\frac{u^2+1}{3}\right)^{-\frac{1}{2}}$

$= \frac{2}{3} \int u^2 \left(\frac{u^2+1}{3}\right)^{\frac{1}{2} - \frac{1}{2}} du$

$= \frac{2}{3} \int u^2 du$

$\frac{2}{3} \left[\frac{u^3}{3}\right] + c \quad ; \quad \frac{2u^3}{9} + c$

(5) $\int \frac{2u}{\sqrt{u^2-1}} dx$

$\frac{2 \left(3t^2+1\right)^{\frac{3}{2}}}{9} + c$

$u = \sqrt{6x^2 - x}$

$u^2 = 6x^2 - 1 \quad 6x^2 = u^2 + 1 \quad x^2 = \frac{u^2+1}{6} \quad x = \sqrt{\frac{u^2+1}{6}}$

$\frac{dx}{du} = \frac{1}{2} \left(\frac{u^2+1}{6}\right)^{-\frac{1}{2}} \cdot \frac{u}{6}$

$\frac{dx}{du} = \frac{u}{6} \left(\frac{u^2+1}{6}\right)^{-\frac{1}{2}}$

$\int 2 \left(\frac{u^2+1}{6}\right)^{\frac{1}{2}} \cdot \frac{u \, du}{6} \left(\frac{u^2+1}{6}\right)^{-\frac{1}{2}}$

$\int \left(\frac{u^2+1}{6}\right)^{\frac{1}{2} - \frac{1}{2}} du$

$\frac{u}{2} + c = \sqrt{\frac{4x^2-1}{2}} + c =$