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Course: Mat 104

Department: Computer Engineering

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Answers

1.  $\int 4 \sec^2(3m+1) dm$

Let  $u = 3m+1$

$du = 3dm$

$dm = \frac{du}{3}$

$\int 4 \sec^2 u \frac{du}{3}$

$\frac{4}{3} \int \sec^2 u du$

Integration of  $\sec^2 u$

$= \tan u + C$

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

$\frac{4}{3} \tan(3m+1) + C$

2.  $\int 2t \times (3t^2-1)^{\frac{1}{2}} dt$

$u = 3t^2-1$

$\frac{du}{dt} = \frac{6t}{6t}$

$dt = \frac{du}{6t}$

$\int 2t \times (u)^{\frac{1}{2}} \frac{du}{6t}$

$\int \frac{1}{3} \times u^{\frac{1}{2}} du$

$\frac{1}{3} \int u^{\frac{1}{2}} du$

$= \frac{1}{3} \times \frac{u^{\frac{1}{2}+1}}{\frac{1}{2}+1} + C$

$= \frac{1}{3} \times \frac{2}{3} u^{\frac{3}{2}} + C$

$= \frac{2}{9} u^{\frac{3}{2}} + C$

$= \frac{2}{9} (3t^2-1)^{\frac{3}{2}} + C$

3.  $\int \frac{2x}{(4x^2-1)^{\frac{1}{2}}} dx$

$= \int 2x (4x^2-1)^{-\frac{1}{2}} dx$

Let  $u = 4x^2-1$

$du = 8x dx$

$dx = \frac{du}{8x}$

$8x$

$= \int 2x (u)^{-\frac{1}{2}} \frac{du}{8x}$

$= \frac{1}{4} \int u^{-\frac{1}{2}} du$

$= \frac{1}{4} \times \frac{u^{-\frac{1}{2}+1}}{-\frac{1}{2}+1}$

$= \frac{1}{4} \times \frac{u^{\frac{1}{2}}}{\frac{1}{2}}$

$= \frac{1}{4} \times 2u^{\frac{1}{2}}$

$= \frac{1}{2} u^{\frac{1}{2}} = \frac{1}{2} (4x^2-1)^{\frac{1}{2}}$