191ENG02105I

Part B

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

Let $u = 3m+1$

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

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

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

$= \frac{4}{3}[\tan u + C]$

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

2) $\int 2t(3t^2-1)^{1/2}\, dt$

Let $u = 3t^2 - 1$

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

$\int 2t \cdot u^{1/2} \cdot \frac{du}{6t}$ 3

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

$= \frac{1}{3}\left[\frac{u^{1/2+1}}{1/2+1}\right] + C$

$= \frac{1}{3}\left[\frac{u^{3/2}}{3/2}\right] + C$

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

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

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

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

Let $u = 4x^2 - 1$

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

$\int 2x \cdot u^{-1/2} \cdot \frac{du}{8x}$ 4

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

$= \frac{1}{4}\left[\frac{u^{-1/2+1}}{-1/2+1}\right] + C$

$= \frac{1}{4}\left[\frac{u^{1/2}}{1/2}\right] + C$

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

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

$= \frac{1}{2}(4x^2-1)^{1/2} + C$