Integrate the following with respect to the variable

Question 1

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

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

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

$u = 3m+1$

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

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

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

$4/3 \int \sec^2 u \, du$

$4/3 [\tan u] + C$

$\int 4\sec^2(3m+1)dm = 4/3 \tan(3m+1) + C$

Question 2

$2t(3t^2-1)^{1/2}$

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

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

$u = (3t^2-1)^{1/2}$

$u^2 = 3t^2 - 1$

$u^2 + 1 = 3t^2$

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

$t = \left(\frac{u^2+1}{3}\right)^{1/2}$

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