1. Differentiate $\ln (x + \sqrt{x^2 + 1})$ with respect to $x$. Hence, find $\int \dfrac{1}{\sqrt{x^2 + 1}}\, dx$.

2. Given that $y = (x + 3)\sqrt{2x - 3}$, show that $\dfrac{dy}{dx} = \dfrac{3x}{\sqrt{2x - 3}}$. Hence, find $\int \dfrac{x}{\sqrt{2x - 3}}\, dx$.

3. Find $\dfrac{d}{dx}(x \cos x)$. Hence, evaluate $\int (\cos x - x \sin x)\, dx$.

4. Differentiate $\dfrac{x^2}{2x - 1}$ with respect to $x$ and hence evaluate $\int \dfrac{x(x - 1)}{(2x - 1)^2}\, dx$.

5. Given that $y = \ln \cos x$, find $\dfrac{dy}{dx}$. Hence, find $\int \tan x\, dx$.

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**Exercise 8.1**

1. $\dfrac{1}{\sqrt{x^2 + 1}}$, $\ln(x + \sqrt{x^2 + 1}) + c$

2. $3(x + 3)\sqrt{2x - 3} + c$

3. $\cos x - x \sin x$; $x \cos x + c$

4. $\dfrac{2x(x - 1)}{(2x - 1)^2}$; $\dfrac{1}{2}\left(\dfrac{x^2}{2x - 1}\right) + c$

5. $-\tan x$, $-\ln |\cos x| + c$