Make use of trigonometric identities to find

a $\int 2\sin x\cos x\,dx$ **b** $\int 2\sin x(\cos x+1)\,dx$

c $\int(\cos x-\sin x)(\cos x-\sin x)dx$

a Transform the integral $\int\frac{1}{4+x^2}dx$ using the substitution $x=2\tan u$

b Use the fact that $1+\tan^2 x=\sec^2 x$ to simplify the integral.

c Integrate with respect to u

d Substitute $u=\tan^{-1}\left(\frac{x}{2}\right)$ to complete the integration with respect to x

e Similarly, find

i $\int\frac{1}{9+x^2}dx$ **ii** $\int\frac{1}{1+4x^2}dx$

2 **a** $-\frac{1}{2}\cos 2x + c$ **b** $-\frac{1}{2}\cos 2x - 2\cos x + c$

c $\frac{1}{2}\sin 2x + c$

3 **a** $\frac{1}{2}\int \frac{\sec^2 u}{1+\tan^2 u}\,\mathrm{d}u$ **b** $\frac{1}{2}\int \mathrm{d}u$

c $\frac{1}{2}u + c$ **d** $\frac{1}{2}\tan^{-1}\left(\frac{x}{2}\right) + c$

e **i** $\frac{1}{3}\tan^{-1}\frac{x}{3} + c$ **ii** $\frac{1}{2}\tan^{-1} 2x + c$