Q	Marking instructions	AO	Marks	Typical solution
10(a)	Recalls $\tan x = \dfrac{\sin x}{\cos x}$	1.2	B1	$\dfrac{d}{dx}(\tan x) = \dfrac{d}{dx}\left(\dfrac{\sin x}{\cos x}\right)$ $= \dfrac{\cos x \cos x - (-\sin x)\sin x}{\cos^2 x}$ $= \dfrac{\sin^2 x + \cos^2 x}{\cos^2 x}$ $= \dfrac{1}{\cos^2 x}$ $= \sec^2 x$
	Uses the correct quotient rule. Condone sign error in differentiation of sin or cosine.	1.1a	M1	
	Completes rigorous argument to show the required result. Use of $\sin^2 x + \cos^2 x = 1$ or $\tan^2 x + 1 = \sec^2 x$ must be explicit. Must include $\dfrac{d}{dx}(\tan x) = \ldots$ or $\dfrac{dy}{dx} = \ldots$	2.1	R1	
	Subtotal		**3**	

Q	Marking instructions	AO	Marks	Typical solution
10(b)	Writes down an integral of the form $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \tan^2 x \, dx$, $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} (1 - \tan^2 x) \, dx$ Condone missing or incorrect limits and missing dx	3.1a	M1	Area under curve $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \tan^2 x \, dx = \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sec^2 x - 1 \, dx$ $= [\tan x - x]_{-\frac{\pi}{4}}^{\frac{\pi}{4}}$ $= \left(\tan\dfrac{\pi}{4} - \dfrac{\pi}{4}\right) - \left(\tan\left(-\dfrac{\pi}{4}\right) - -\dfrac{\pi}{4}\right)$ $= 1 - \dfrac{\pi}{4} + 1 - \dfrac{\pi}{4}$ $= 2 - \dfrac{\pi}{2}$ Area of shaded region $\dfrac{\pi}{2} - \left(2 - \dfrac{\pi}{2}\right)$ $= \pi - 2$
	Uses $\tan^2 x + 1 = \sec^2 x$ to write integrand in a form which can be integrated, condone sign error.	3.1a	M1	
	Integrates their expression of the form $A\sec^2 x + B$	1.1b	A1F	
	Forms an expression for or evaluates the area of the relevant rectangle. $2\dfrac{\pi}{4}\tan^2\dfrac{\pi}{4}$ or $\dfrac{\pi}{4}\tan^2\dfrac{\pi}{4}$ Could be implicit within their integral	1.1b	B1	
	Completes rigorous argument to show the required result. Substitution of consistent limits should be explicit and no slips in algebra. Use of dx is required. AG	2.1	R1	
	Subtotal		**5**	

	Question Total		**8**	