(1 نضع $u(x) = x^2 + 1$ إذن $u'(x) = 2x$

ومنه :
$$\int_0^1 \frac{x}{(x^2+1)^2}\,dx = \frac{1}{2}\int_0^1 \frac{u'(x)}{(u(x))^2}\,dx$$
$$= \frac{1}{2}\left[-\frac{1}{u(x)}\right]_0^1$$
$$= -\frac{1}{2}\left[\frac{1}{x^2+1}\right]_0^1$$
$$= \frac{1}{4}$$

(2 (a نضع $u(x) = \cos x$ إذن $u'(x) = -\sin x$

ومنه :
$$\int_0^{\frac{\pi}{4}} \tan x\,dx = \int_0^{\frac{\pi}{4}} \frac{\sin x}{\cos x}\,dx$$
$$= -\int_0^{\frac{\pi}{4}} \frac{u'(x)}{u(x)}\,dx$$
$$= -\left[\ln|u(x)|\right]_0^{\frac{\pi}{4}}$$
$$= -\left[\ln(\cos x)\right]_0^{\frac{\pi}{4}}$$
$$= \frac{1}{2}\ln 2$$

b) نعتبر التكامل $I = \int_0^{\frac{\pi}{4}} \frac{x}{\cos^2 x} dx$

نضع : $\begin{cases} u(x) = x \\ v'(x) = \frac{1}{\cos^2 x} \end{cases}$ إذن : $\begin{cases} u'(x) = 1 \\ v(x) = \tan x \end{cases}$

التكامل I يصبح :

$$I = \int_0^{\frac{\pi}{4}} \frac{x}{\cos^2 x} dx$$

$$= \int_0^{\frac{\pi}{4}} u(x) v'(x) dx$$

$$= [u(x) v(x)]_0^{\frac{\pi}{4}} - \int_0^{\frac{\pi}{4}} u'(x) v(x) dx$$

$$= [x \tan x]_0^{\frac{\pi}{4}} - \int_0^{\frac{\pi}{4}} \tan x \, dx$$

$$= \frac{\pi}{4} - \frac{1}{2} \ln 2$$