(1) [8] Evaluate

$$\int_0^1 \frac{y}{e^{3y}}\,dy = \int_0^1 y e^{-3y}\,dy$$

Let $I = \int y e^{-3y}\,dy$

$$u = y, \quad dv = e^{-3y}\,dy$$

$$du = dy, \quad v = \frac{e^{-3y}}{-3}$$

$\therefore$
$$I = \int u\,dv$$
$$= uv - \int v\,du$$
$$= (y)\left(\frac{e^{-3y}}{-3}\right) - \int \left(\frac{e^{-3y}}{-3}\right) dy$$
$$= -\frac{y}{3e^{3y}} - \frac{1}{9e^{3y}} + C$$

$\therefore$
$$\int_0^1 \frac{y}{e^{3y}}\,dy = \Big[I\Big]_0^1$$
$$= \left(-\frac{1}{3e^3} - \frac{1}{9e^3}\right) - \left(-0 - \frac{1}{9}\right)$$
$$= -\frac{1}{3e^3} - \frac{1}{9e^3} + \frac{1}{9}$$
$$= -\frac{3+1-e^3}{9e^3}$$
$$= \boxed{\frac{e^3-4}{9e^3}}$$

(2) [7] Determine

$$I = \int \sec^4 x \tan^2 x \, dx$$

$$= \int \sec^2 x \tan^2 x \sec^2 x \, dx$$

$$= \int (1 + \tan^2 x) \tan^2 x \sec^2 x \, dx$$

let $u = \tan x$

$du = \sec^2 x \, dx$

$$\therefore I = \int (1 + u^2) u^2 \, du$$

$$= \int (u^2 + u^4) \, du$$

$$= \frac{u^3}{3} + \frac{u^5}{5} + C$$

$$= \boxed{\frac{\tan^3 x}{3} + \frac{\tan^5 x}{5} + C}$$