5. Evaluate the following integrals.

a. $\displaystyle\int_0^1 x^5 \sqrt[4]{1-x^3}\,dx \;=\; -\frac{1}{3}\int_1^0 (1-u)\cdot u^{1/4}\,du \;=\; \frac{1}{3}\int_0^1 \left(u^{1/4}-u^{5/4}\right)du$

$$\boxed{\begin{array}{l} u=1-x^3 \\ du=-3x^2\,dx \end{array}}$$

$= \dfrac{1}{3}\left[\dfrac{u^{5/4}}{5/4}-\dfrac{u^{9/4}}{9/4}\right]_0^1 = \dfrac{1}{3}\left(\dfrac{4}{5}-\dfrac{4}{9}\right)=\dfrac{16}{135}$

b. $\displaystyle\int \sin 2x\,\tan^2 x\,dx \;=\; \int 2\sin x\cos x\cdot\frac{\sin^2 x}{\cos^2 x}\,dx = 2\int \frac{1-\cos^2 x}{\cos x}\cdot\sin x\,dx$

$= -2\int\left(\frac{1}{u}-u\right)du = -2\ln|u|+u^2+C = \cos^2 x - 2\ln|\cos x|+C$

$$\boxed{\begin{array}{l} u=\cos x \\ du=-\sin x\,dx \end{array}}$$