Problem:

Find the general solution of the differential equation:

$\frac{dy}{\sin 7x} + \cos^2 5y\, dx = 0.$

Solution:

This is an equation with separable variables ⇒

$\Rightarrow \frac{dy}{\cos^2 5y} = -\sin 7x\, dx$, let's integrate $\Rightarrow \int \frac{dy}{\cos^2 5y} = -\int \sin 7x\, dx \Rightarrow \frac{1}{5}\int \frac{d(5y)}{\cos^2 5y} = -\frac{1}{7}\int \sin 7x\, d(7x)$,

$\frac{1}{5}\tan 5y = \frac{1}{7}\cos 7x + C \Rightarrow$ we obtain the general integral of the equation:

$\boxed{\frac{1}{5}\tan 5y - \frac{1}{7}\cos 7x = C}$ or we can write the solution in an explicit form: $\boxed{y = \frac{1}{5}\tan^{-1}(\frac{5}{7}\cos 7x + 5C)}$.