2 - $I_2 = \int \sin^2 x \cos^2 x \, dx$.

P et q pair on pose $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$

$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$.

$I_2 = \int \frac{1}{2}(1 - \cos 2x) \frac{1}{2}(1 + \cos 2x) \, dx$.

$= \frac{1}{4} \int (1 - \cos 2x)(1 + \cos 2x) \, dx$.

$= \frac{1}{4} \int 1 - \cos^2 2x \, dx$.

Comme $\cos^2 ax = \frac{1}{2}(1 + \cos 2ax)$

donc

$\cancel{I_2 = \frac{1}{4} \int 1 - \cos^2 4x \, dx}$

$I_2 = \frac{1}{4} \int 1 - \left(\frac{1}{2} + \frac{\cos 4x}{2}\right) dx$.

$I_2 = \frac{1}{4} \int \left(\frac{1}{2} - \frac{\cos 4x}{2}\right) dx = \frac{1}{8} \int dx - \frac{1}{8} \int \cos 4x \, dx$.

$\boxed{I_2 = \frac{x}{8} - \frac{\sin 4x}{32} + c}$

$\frac{1}{a} \sin(ax)$

③ $I_3 = \int \sin 3x . \cos 5x \, dx$.

On a: $\sin(ax)\cos(bx) = \frac{1}{2}\left[\sin(a+b)x + \sin(a-b)x\right]$.

donc.

$I_3 = \int \sin(3x)\cos(5x) \, dx = \frac{1}{2} \int \sin(8x) + \sin(-2x) \, dx$.

$= \frac{1}{2}\left[\frac{-1}{8}\cos(8x)\right] - \frac{1}{2} \int \sin(2x) \, dx = \frac{-\cos(8x)}{16} + \frac{\cos(2x)}{4} + c$