$$= \frac{1}{192}\left[60x - 45\sin 2x + 9\sin 4x - \sin 6x\right] + C$$

(2) $\cos^4 x \sin^3 x$

$$= \int \sin^3 x \cos^4 x \, dx$$

$$\sin^3 x \cos^4 x = (1-\cos^2 x)\cos^4 x \sin x$$

$$= \cos^4 x \sin x - \cos^6 x \sin x$$

$$\int (\cos^4 \cancel{x} \sin x - \cos^6 x \sin x)\, dx$$

$$= -\frac{1}{5}\cos^5 x + \frac{1}{7}\cos^7 x + C$$

(3) $\cos x \sin^3 x$

$\cancel{\text{it}} \Rightarrow \int \sin^3 x \cos x \, dx$

let $u = \sin x$

$$\frac{du}{dx} = \cos x$$

$$du = \cos x \, dx$$

$\Rightarrow$

$$= \frac{1}{6}\Big(3 - 7\cos 2x + \cos 4x + 2(1+\cos 4x)\Big)$$

$$- \tfrac{1}{2}(\cos 6x + \cos 2x)$$

$$= \frac{1}{16}\Big(3 - 7\cos 2x + \cos 4x + 2 + 2\cos 4x - \tfrac{1}{2}(\cos 6x + \cos 2x\Big)$$

$$= \frac{1}{32}\Big(6 - 14\cos 2x + 2\cos 4x + 4 + 4\cos 4x - \cos 6x - \cos 2x\Big)$$

$$= \frac{1}{32}\Big(10 - 15\cos 2x + 6\cos 4x - \cos 6x\Big)$$

$$= \frac{1}{32}\int(10 - 15\cos 2x + 6\cos 4x - \cos 6x$$

$$dx$$

$$= \frac{1}{32}\left(10x - \frac{15\sin 2x}{2} + \frac{6\sin 4x}{4} - \frac{\sin 6x}{6}\right) + $$

$$= \frac{1}{32}\left(10x - \frac{15\sin 2x}{2} + \frac{6\sin 4x}{2} : \frac{\sin 6x}{6}\right) +$$

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(i) $\sin^6 x$

$\int \sin 6x \, dx$

$\sin 6x = (\sin^2 x)^2 (\sin^2 x)$

$= \left(\frac{1 - \cos 2x}{2}\right)^2 \left(\frac{1 - \cos 2x}{2}\right)$

$= \frac{1}{8}\left(1 - 2\cos 2x + \cos^2 2x\right)\left(1 - \cos 2x\right)$

$= \frac{1}{8}\left(1 - 2\cos 2x + \frac{1 + \cos 4x}{2}\right)\left(1 - \cos 2x\right)$

$= \frac{1}{16}\left(3 - 4\cos 2x + \cos 4x\right)\left(1 - \cos 2x\right)$

$= \frac{1}{16}\left(3 - 4\cos 2x + \cos 4x - 3\cos 2x + 4\cos^2 2x - \cos 4x \cos 2x\right)$

$= \frac{1}{6}\left(3 - 7\cos 2x + \cos 4x + 2 \times 2\cos^2 x - \frac{1}{2} \cdot 2\cos 4x \cos 2x\right)$