(11) $\int (\sin(3x+6) - 4\cos x)\, dx$

$= \int (\sin(3x+6))\, dx - 4\int \cos x \, dx$

$= -\frac{1}{3}\cos(3x+6) - 4\sin x + C.$

(12) $\int \cos^2 x \, dx.$

$\cos 2x = \cos^2 x - \sin^2 x$

$= 2\cos^2 x - 1$

$\Rightarrow \cos^2 x = \frac{\cos 2x + 1}{2}$

$= \int \frac{\cos 2x + 1}{2}\, dx$

$= \frac{1}{2}\int \cos 2x \, dx + \int \frac{1}{2}\, dx$

$= \frac{\sin 2x}{2} + \frac{x}{2} + C$

$= \frac{\sin 2x + x}{2} + C.$

(13) $\int \sin x \sin 3x \, dx$

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

$= \frac{\sin 2x}{4} + \frac{\sin 4x}{8} + C$

$= \frac{\sin 4x + 2\sin 2x}{8} + C$

(14) $\int \sin^3 x \, dx$

$\sin 3x = 3\sin x - 4\sin^3 x$

$\hookrightarrow \sin^3 x = \frac{3\sin x - \sin 3x}{4}$

$= \int \frac{3\sin x - \sin 3x}{4}\, dx$

$= -\frac{3\cos x}{4} + \frac{\cos 3x}{12} + C.$

Made with Goodnotes

(15) $\int (1+\tan^2 x)\,dx = \int \left(\cancel{1}+ \frac{\sin^2 x}{\cos^2 x} \right) dx$

$\boxed{\cancel{= \int dx + \int \boxed{\tan^2 x}\,dx}}$

$= \int \frac{\boxed{\sin^2 x + \cos^2 x}}{\cos^2 x}\,dx$

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

$= \int \sec^2 x\,dx = \tan x + c.$

(16) Try $\int \tan^2 x\,dx \; \underbrace{\boxed{+ \int 1\,dx}}_{x + c''} = \tan x + c'$

$\Rightarrow \int \tan^2 x\,dx = \tan x - x + c'''$

$\int \tan^2(-x+2)\,dx \left[= \int \tan^2(x-2)\,dx \right]$

$= -\tan(-x+2) - (-x+2) + c$

$= -\tan(-x+2) + x - 2 + c.$