eg ① $\int (x^2-4)\sqrt{\tfrac{1}{2}x+1}\,dx$

Let $u = \frac{1}{2}x+1$

$du = \frac{1}{2}\,dx \rightarrow 2du = dx$

Then $\frac{1}{2}x = u-1$

$x = 2u-2$

$x^2 = (2u-2)^2 = 4u^2-8u+4$

$x^2-4 = 4u^2-8u$

The integral becomes

$$\int (x^2-4)\sqrt{\tfrac{1}{2}x+1}\,dx = \int (4u^2-8u)\sqrt{u}\cdot 2du$$

$$= 8\int (u^2-2u)\sqrt{u}\,du$$

$$= 8\int (u^{5/2}-2u^{3/2})\,du$$

$$= 8\left[\frac{u^{7/2}}{7/2} - 2\cdot\frac{u^{5/2}}{5/2}\right] + C$$

$$\boxed{= \frac{16}{7}\left(\tfrac{1}{2}x+1\right)^{7/2} - \frac{32}{5}\left(\tfrac{1}{2}x+1\right)^{5/2} + C}$$

(2) $\int \sin(2x)\sin(x)\,dx$

$= \int 2\sin(x)\cos(x)\cdot\sin(x)\,dx$

$= 2\int \sin^2(x)\cos(x)\,dx$ Let $u = \sin(x)$

$du = \cos(x)dx$

$= 2\int u^2\,du$

$= 2\left[\frac{u^3}{3}\right] + C$

$\boxed{= \frac{2}{3}\sin^3(x) + C}$