$$\int (x+2)^5 \, dx$$

Let $u = x+2$

$$\frac{du}{dx} = 1$$

$$du = dx$$

$$\int u^5 \, du$$

$$\frac{u^6}{6} + C$$

$$\frac{(x+2)^6}{6} + C$$

$$\frac{1}{2}\int 2x(x^2+2)^6\,dx$$

$$\frac{1}{2}\int (x^2+2)^6\,2x\,dx$$

$$\frac{1}{2}\int u^6\,du$$

$$\frac{1}{2}\cdot\frac{u^7}{7}+C$$

$$\frac{(x^2+2)^7}{14}+C$$

Let $u = x^2+2$

$\frac{du}{dx} = 2x$

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

$du = 2x\,dx$

$$\frac{1}{2}\int 2x\left(x^2+2\right)^6\,dx$$

Let $u = x^2+2$

$$\frac{du}{dx} = 2x$$

$$du = 2x\,dx$$

$$\int x\,(u)^6\,\frac{du}{2x}$$

$$dx = \frac{du}{2x}$$

$$\int \frac{1}{2}u^6\,du$$

$$\frac{1}{2}\int \sin 2x \, 2\,dx$$

Let $u = 2x$

$du = 2\,dx$

$$\frac{1}{2}\int \sin u \, du$$

$$\frac{1}{2}(-\cos u) + C$$

$$-\frac{\cos 2x}{2} + C$$

$$\int \frac{9r^2}{\sqrt{1-r^3}}\,dr$$

Let $u = 1 - r^3$

$\frac{du}{dr} = -3r^2$

$dr = \frac{-1}{3r^2}\,du$

$$\int \frac{9r^2}{\sqrt{u}} \cdot \frac{-1}{3r^2}\,du$$

$$\int -3u^{-\frac{1}{2}}\,du$$

$$-3\int u^{-\frac{1}{2}}\,du$$

$$-3 \cdot 2u^{\frac{1}{2}} + C$$

$$-6\sqrt{1-r^3} + C$$

$$\int \frac{9r^2}{\sqrt{1-r^3}}\,dr$$

Let $u = 1 - r^3$

$du = -3r^2\,dr$

$$\int -3 \cdot \frac{1}{\sqrt{1-r^3}} \cdot -3r^2\,dr$$

$$-3\int \frac{1}{\sqrt{u}}\,du$$

$$-3\int u^{-\frac{1}{2}}\,du$$

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

Let $u = 2x^2$

$du = 4x\,dx$

$\frac{1}{4}\int \cos u\,du$

$\frac{1}{4}\sin u + C$

$\frac{1}{4}\sin 2x^2 + C$

$$\frac{dy}{dx} = g(x)\,h(y)$$

$$\frac{dy}{dx} = 2x\left(1+y^2\right)e^{x^2}$$

$$\int \frac{1}{1+y^2}\,dy = \int 2xe^{x^2}\,dx$$