$$\int f'(x)[f(x)]^n\,dx$$

$$\boxed{\int f'(x)[f(x)]^n\,dx = \frac{[f(x)]^{n+1}}{n+1} + c}$$

e.g. (i) a) Find $\frac{d}{dx}\left\{\sqrt{1-x^3}\right\}$

$$\frac{d}{dx}\left\{\sqrt{1-x^3}\right\} = \frac{1}{2}\left(1-x^3\right)^{-\frac{1}{2}}\left(-3x^2\right)$$

$$\underline{= \frac{-3x^2}{2\sqrt{1-x^3}}}$$

b) Hence find; $\int \frac{x^2}{\sqrt{1-x^3}}dx$

$$\int \frac{x^2}{\sqrt{1-x^3}}dx = -\frac{2}{3}\int \frac{-3x^2}{2\sqrt{1-x^3}}dx$$

$$= -\frac{2}{3}\sqrt{1-x^3} + c$$

$(ii)\int x\sqrt{2+x^2}dx$

$$= \frac{1}{2}\int 2x\sqrt{2+x^2}dx$$

$$= \frac{1}{2}\cdot\frac{2}{3}\left(2+x^2\right)^{\frac{3}{2}} + c$$

$$= \frac{1}{3}\left(2+x^2\right)\sqrt{2+x^2} + c$$

OR

$$\int x\sqrt{\underbrace{2+x^2}_{u}}\,dx$$

$$\frac{1}{2}du$$

$$= \frac{1}{2}\int u^{\frac{1}{2}}du$$

$$= \frac{1}{2}\cdot\frac{2}{3}u^{\frac{3}{2}} + c$$

$$= \frac{1}{3}\left(2+x^2\right)\sqrt{2+x^2} + c$$

$$u = 2+x^2$$

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

$$du = 2xdx$$

$$(iii)\int_0^1 \frac{x^2}{\left(x^3-2\right)^3}dx$$

OR

$$\int_0^1 \frac{x^2}{\left(x^3-2\right)^3}dx$$

$$u = x^3 - 2$$

$$du = 3x^2 dx$$

$$x = 0, u = -2$$

$$x = 1, u = -1$$

$$= \frac{1}{3}\int_0^1 \frac{3x^2}{\left(x^3-2\right)^3}dx$$

$$= \frac{1}{3}\int_0^1 3x^2\left(x^3-2\right)^{-3}dx$$

$$= -\frac{1}{6}\left[\left(x^3-2\right)^{-2}\right]_0^1$$

$$= -\frac{1}{6}\left\{\frac{1}{(-1)^2}-\frac{1}{(-2)^2}\right\}$$

$$= -\frac{1}{8}$$

$$= \frac{1}{3}\int_{-2}^{-1} u^{-3}du$$

$$= -\frac{1}{6}\left[u^{-2}\right]_{-2}^{-1}$$

$$= -\frac{1}{6}\left\{\frac{1}{(-1)^2}-\frac{1}{(-2)^2}\right\}$$

$$= -\frac{1}{8}$$

Exercise 5I; 7, 9, 12, 14achj, 15bd, 16b, 17