

# Text Review: Integration Part 2

**D** 1.  $\int_1^3 \frac{x}{x^2+1} dx$   $u=x^2+1$   
 $du=2x dx$   
 $\frac{1}{2} du = x dx$

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

$$\frac{1}{2} \ln|u|$$

$$\left. \frac{1}{2} \ln|x^2+1| \right|_1^3$$

$$\frac{1}{2} \ln 10 - \frac{1}{2} \ln 2$$

$$\frac{1}{2} \ln \frac{10}{2}$$

$$\boxed{\frac{1}{2} \ln 5}$$

**A** 2.  $\frac{1}{2} \int_0^2 x^2 \sqrt{x^3+1} dx$   $u=x^3+1$   
 $du=3x^2 dx$   
 $\frac{1}{3} du = x^2 dx$

$$\frac{1}{2} \cdot \frac{1}{3} \int \sqrt{u} du$$

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

$$\frac{1}{6} \cdot \frac{2u^{3/2}}{3}$$

$$\left. \frac{2}{18} (x^3+1)^{3/2} \right|_0^2$$

$$\frac{1}{9} \left[ 27 - 1 \right]$$

$$\boxed{\frac{26}{9}}$$

**B**  $\frac{dy}{dx} = \sin x \cos^2 x$

$$y = - \int \sin x \cos^2 x dx$$

$$u = \cos x$$

$$du = -\sin x dx$$

$$-du = \sin x dx$$

$$y = - \int u^2 du$$

$$y = - \frac{u^3}{3} + C$$

$$y = - \frac{\cos^3 x}{3} + C$$

$$0 = - \frac{\cos^3(\pi/2)}{3} + C$$

$$0 = 0 + C$$

$$0 = C$$

$$y = - \frac{\cos^3 x}{3}$$

$$y = - \frac{\cos^3(0)}{3}$$

$$\boxed{y = -1/3}$$