

## 6.3 Volumes by Cylindrical Shells

### 單選題

1. Let  $R = \{(x, y) | (x - 1 - \sqrt{2})^2 + (y - 1)^2 \leq 1\}$  and  $S$  be the solid obtained by rotating  $R$  about the line  $x = y$ . The **volume** of  $S$  is  
(A)  $\pi^2$ ;      (B)  $2\pi^2$ ;      (C)  $3\pi^2$ ;      (D)  $4\pi^2$  .

Ans: B [103 學年度]

### 多選題

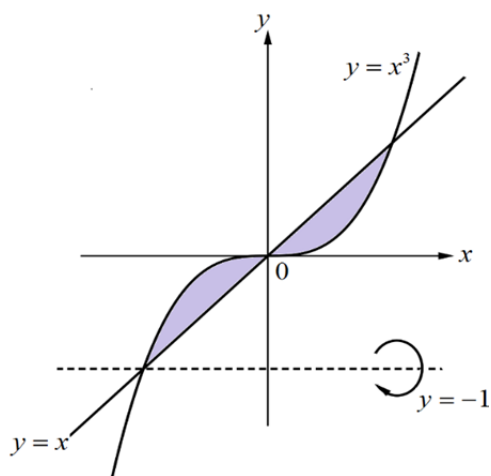
1. Let  $f: [0, 1] \rightarrow R$  be a one-to-one continuous function satisfying  $f(0) = 0$ ,  $f(1) = 1$  and  $g$  be the inverse function of  $f$ . Let  $S$  be the solid obtained by rotating the region  $\{(x, y) | 0 \leq x \leq 1, 0 \leq y \leq f(x)\}$  about the  $x$ -axis. Which of the following integrals denotes the **volume** of  $S$ .

- (A)  $\pi \int_0^1 f^2(x) dx$  ;      (B)  $\pi \int_0^1 g^2(y) dy$  ;  
(C)  $2\pi \int_0^1 yg(y) dy$ ;      (D)  $2\pi \int_0^1 y(1 - g(y)) dy$ .

Ans: AD [103 學年度]

### 填充題

1. Find the **volume** of the solid generated by rotating region enclosed by  $y = x^3$  and  $y = x$  about the line  $y = -1$ . \_\_\_\_\_



Ans:  $\pi$  [100 學年度]

2. Let  $\Omega$  be the region bounded by  $y = x^2 - 2x$  and  $y = 0$ . Then the **volume** of the solid obtained by rotating  $\Omega$  about  $y$ -axis is \_\_\_\_\_.

Ans:  $\frac{8\pi}{3}$  [101 學年度]

3. [102]Let

$$f(x) = \begin{cases} \frac{\sin x}{x}, & \text{if } 0 < x \leq \pi, \\ 1, & \text{if } x = 0. \end{cases}$$

The **volume** of the solid obtained by rotating the region bounded by  $y = f(x)$ , the  $x$ -axis, and the  $y$ -axis about **the  $y$ -axis** is \_\_\_\_\_.

Ans:  $4\pi$  [102 學年度]