

### 第3章3 「行列の積の行列式」 第3回

#### 解答

1. (1)  $-10$  (2)  $4$  (3)  $25$   
 (4)  $50$  (5)  $-40$  (6)  $100$
2. (1)  $-12$  (2)  $-12$  (3)  $-72$
3. (1)  $3$  (2)  $-2$  (3)  $-6$   
 (4)  $-6$  (5)  $-6$  (6)  $-18$
4. (1)  $-\frac{1}{3}$  (2)  $\frac{1}{2}$  (3)  $-\frac{3}{2}$   
 (4)  $-\frac{1}{6}$  (5)  $2$  (6)  $-3$

#### 解説

1. (1)  $|AB| = |A||B| = 2 \times (-5) = -10$  (2)  $|A^2| = |AA| = |A||A| = |A|^2 = 2^2 = 4$   
 (3)  $|B^2| = |BB| = |B||B| = |B|^2 = (-5)^2 = 25$  (4)  $|BAB| = |B||A||B| = -5 \times 2 \times (-5) = 50$   
 (5)  $|A^2BA| = |A|^2|B||A| = 2^2 \times (-5) \times 2 = -40$  (6)  $|ABAB| = |A||B||A||B| = 2 \times (-5) \times 2 \times (-5) = 100$
2. (1)  $|ABC| = |A||B||C| = 3 \times (-2) \times 2 = -12$  (2)  $|CAB| = |C||A||B| = 2 \times (-2) \times 3 = -12$   
 (3)  $|A^2BC^2| = |A|^2|B||C|^2 = 3^2 \times (-2) \times 2^2 = -72$
3. (1)  ${}^tA = |A| = 3$  (2)  ${}^tB = |B| = -2$   
 (3)  $|A{}^tB| = |A|{}^tB = |A||B| = 3 \times (-2) = -6$  (4)  $|B{}^tA| = |B|{}^tA = |B||A| = -2 \times 3 = -6$   
 (5)  ${}^tA{}^tB = {}^tA|B| = |A||B| = 3 \times (-2) = -6$  (6)  ${}^tAAB = {}^tA|A||B| = |A||A||B| = 3 \times 3 \times (-2) = -18$
4. (1)  $|A^{-1}| = \frac{1}{|A|} = -\frac{1}{3}$  (2)  $|B^{-1}| = \frac{1}{|B|} = \frac{1}{2}$   
 (3)  $|AB^{-1}| = |A||B^{-1}| = |A|\frac{1}{|B|} = -\frac{3}{2}$  (4)  $|A^{-1}B^{-1}| = |A^{-1}||B^{-1}| = \frac{1}{|A|}\frac{1}{|B|} = -\frac{1}{6}$   
 (5)  $|ABA^{-1}| = |A||B||A^{-1}| = |A||B|\frac{1}{|A|} = |B| = 2$  (6)  $|B^{-1}AB| = |B^{-1}||A||B| = \frac{1}{|B|}|A||B| = |A| = -3$