

Let  $A$  be a  $3 \times 3$  real matrix. If  $\det(2\text{Adj}(2\text{Adj}(\text{Adj}(2A)))) = 2^{41}$ , then the value of  $\det(A^2)$  equal \_\_\_\_\_.

### Answer

Correct Answer is 4

### Explanation

$$\text{adj}(2A) = 2^2 \text{adj}A$$

$$\Rightarrow \text{adj}(\text{adj}(2A)) = \text{adj}(4 \text{adj}A) = 16 \text{adj}(\text{adj}A)$$

$$= 16 |A| A$$

$$\Rightarrow \text{adj}(32 |A| A) = (32 |A|)^2 \text{adj}A$$

$$12(32 |A|)^2 |\text{adj}A| = 2^3 (32 |A|)^6 | \text{adj}A |$$

$$2^3 \cdot 2^{30} |A|^6 \cdot |A|^2 = 2^{41}$$

$$|A|^8 = 2^8 \Rightarrow |A| = \pm 2$$

$$|A|^2 = |A|^2 = 4$$