

2016年第4問


 数理
石井K

4 次の式を計算せよ.

$$(\sqrt{2}-1)^7 \quad \text{二項定理より.}$$

$$\begin{aligned} (\sqrt{2}-1)^7 &= (\sqrt{2})^7 - {}_7C_1 \cdot (\sqrt{2})^6 + {}_7C_2 \cdot (\sqrt{2})^5 - {}_7C_3 \cdot (\sqrt{2})^4 + {}_7C_4 \cdot (\sqrt{2})^3 - {}_7C_5 \cdot (\sqrt{2})^2 + {}_7C_6 \cdot \sqrt{2} - {}_7C_7 \\ &= 8\sqrt{2} - 7 \cdot 8 + 21 \cdot 4\sqrt{2} - 35 \cdot 4 + 35 \cdot 2\sqrt{2} - 21 \cdot 2 + 7\sqrt{2} - 1 \\ &= \underline{169\sqrt{2} - 239} \end{aligned}$$

どちらでも
大差なかった

$$(別) (\sqrt{2}-1)^2 = 3-2\sqrt{2} \text{ より.}$$

$$\begin{aligned} (\sqrt{2}-1)^7 &= (3-2\sqrt{2})^3 \cdot (\sqrt{2}-1) \\ &= (3-2\sqrt{2})^2 \cdot (3-2\sqrt{2})(\sqrt{2}-1) \\ &= (17-12\sqrt{2})(-7+5\sqrt{2}) \\ &= -119 + 85\sqrt{2} + 84\sqrt{2} - 120 \\ &= \underline{-239 + 169\sqrt{2}} \end{aligned}$$