

展開と因数分解 [工夫した数の計算]

<演習問題>

乗法公式を用いて計算せよ。

(1) 99^2

(2) 51^2

(3) 103×97

(4) 1.05×0.95

(5) 71^2

(6) 202×198

(7) 1999^2

<演習問題>

因数分解を用いて計算せよ。

(1) $64^2 - 36^2$

(2) $94^2 - 93^2$

(3) $91^2 - 109^2$

(4) $1.75^2 - 0.25^2$

(5) $0.99^2 - 0.01^2$

(6) $0.55^2 - 0.54^2$

(7) $76^2 - 24^2$

(8) $\frac{107^2}{54^2 - 53^2}$

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乗法公式を用いて計算せよ。

(1) 99^2

$$\begin{aligned}99^2 &= (100 - 1)^2 \\ &= 100^2 - 2 \times 100 \times 1 + 1^2 \\ &= 10000 - 200 + 1 \\ &= 9801\end{aligned}$$

(2) 51^2

$$\begin{aligned}51^2 &= (50 + 1)^2 \\ &= 50^2 + 2 \times 50 \times 1 + 1^2 \\ &= 2500 + 100 + 1 \\ &= 2601\end{aligned}$$

(3) 103×97

$$\begin{aligned}103 \times 97 &= (100 + 3)(100 - 3) \\ &= 100^2 - 3^2 \\ &= 10000 - 9 \\ &= 9991\end{aligned}$$

(4) 1.05×0.95

$$\begin{aligned}1.05 \times 0.95 &= (1 + 0.05)(1 - 0.05) \\ &= 1^2 - 0.05^2 \\ &= 1 - 0.0025 \\ &= 0.9975\end{aligned}$$

(5) 71^2

$$\begin{aligned}71^2 &= (70 + 1)^2 \\ &= 70^2 + 2 \times 70 \times 1 + 1^2 \\ &= 4900 + 140 + 1 \\ &= 5041\end{aligned}$$

(6) 202×198

$$\begin{aligned}202 \times 198 &= (200 + 2)(200 - 2) \\ &= 200^2 - 2^2 \\ &= 40000 - 4 \\ &= 39996\end{aligned}$$

(7) 1999^2

$$\begin{aligned}1999^2 &= (2000 - 1)^2 \\ &= 2000^2 - 2 \times 2000 \times 1 + 1^2 \\ &= 4000000 - 4000 + 1 \\ &= 3996001\end{aligned}$$

<演習問題>

因数分解を用いて計算せよ。

(1) $64^2 - 36^2$

$$\begin{aligned}64^2 - 36^2 &= (64 + 36)(64 - 36) \\ &= 100 \times 28 \\ &= 2800\end{aligned}$$

(2) $94^2 - 93^2$

$$\begin{aligned}94^2 - 93^2 &= (94 + 93)(94 - 93) \\ &= 187 \times 1 \\ &= 187\end{aligned}$$

(3) $91^2 - 109^2$

$$\begin{aligned}91^2 - 109^2 &= (91 + 109)(91 - 109) \\ &= 200 \times (-18) \\ &= -3600\end{aligned}$$

(4) $1.75^2 - 0.25^2$

$$\begin{aligned}1.75^2 - 0.25^2 &= (1.75 + 0.25)(1.75 - 0.25) \\ &= 2 \times 1.5 \\ &= 3\end{aligned}$$

(5) $0.99^2 - 0.01^2$

$$\begin{aligned}0.99^2 - 0.01^2 &= (0.99 + 0.01)(0.99 - 0.01) \\ &= 1 \times 0.98 \\ &= 0.98\end{aligned}$$

(6) $0.55^2 - 0.54^2$

$$\begin{aligned}0.55^2 - 0.54^2 &= (0.55 + 0.54)(0.55 - 0.54) \\ &= 1.09 \times 0.01 \\ &= 0.0109\end{aligned}$$

(7) $76^2 - 24^2$

$$\begin{aligned}76^2 - 24^2 &= (76 + 24)(76 - 24) \\ &= 100 \times 52 \\ &= 5200\end{aligned}$$

(8) $\frac{107^2}{54^2 - 53^2}$

$$\begin{aligned}\frac{107^2}{54^2 - 53^2} &= \frac{107^2}{(54 + 53)(54 - 53)} \\ &= \frac{107^2}{107 \times 1} \\ &= 107\end{aligned}$$