

U1 (1/1 point)

Of the integer numbers from 1 to 10000, how many are neither a square nor a cube of an integer?

9883

9883

Check

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U2 (1/1 point)

How many permutations of 1,2,3, ..., 9 have at least one odd number in its natural position?

157824

157824

Answer: 157824**EXPLANATION**

Let us denote the permutations of 1,2,3,...,9 by $p_1 p_2 p_3 \dots p_9$. Let A_1 be the set of permutations in which $p_1=1$, A_2 the set in which $p_3=3$, A_3 the set in which $p_5=5$, A_4 the set in which $p_7=7$, and A_5 the set in which $p_9=9$

The answer can be produced by determining $|A_1 \cup A_2 \cup A_3 \cup A_4 \cup A_5|$

$$\begin{aligned}
 |A_1| &= |A_2| = |A_3| = |A_4| = |A_5| = 8! \\
 |A_1 \cap A_2| &= |A_1 \cap A_3| = |A_1 \cap A_4| = \dots = |A_4 \cap A_5| = 7! \\
 |A_1 \cap A_2 \cap A_3| &= |A_1 \cap A_2 \cap A_4| = \dots = 6! \\
 |A_1 \cap A_2 \cap A_3 \cap A_4| &= |A_1 \cap A_2 \cap A_3 \cap A_5| = \dots = 5! \\
 |A_1 \cap A_2 \cap A_3 \cap A_4 \cap A_5| &= 4! \\
 |A_1 \cup A_2 \cup A_3 \cup A_4 \cup A_5| &= \\
 C(5,1) \times 8! - C(5,2) \times 7! + C(5,3) \times 6! - C(5,4) \times 5! + C(5,5) \times 4! \\
 &= 157824
 \end{aligned}$$

Final Check

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