NMSU MATH PROBLEM OF THE WEEK

Solution to Problem 6

Fall 2024

Problem 6

A 6-digit number $\overline{ABCDE4}$ multiplied by 4 is equal to another 6-digit number $\overline{4ABCDE}$. Find A, B, C, D, and E. Justify your answer.

Solution. We will show that there are unique values A, B, C, D, and E satisfying the conditions in the problem statement. We first note that since $4 \cdot 4 = 16$, and this is the only contribution to the last digit of $\overline{4ABCDE}$, that $E = 6$. We then have $4 \cdot \overline{ABCD64}$ so that $\overline{4ABCDE}$ ends in 56 and hence $D = 5$. We then have $4 \cdot \overline{ABC564}$ so that $\overline{4ABCDE}$ ends in 256 and hence $C = 2$. We then have $4 \cdot \overline{AB2564}$ so that $\overline{4ABCDE}$ ends in 0256 and hence $B = 0$. We then have $4 \cdot \overline{A02564}$ so that $\overline{4ABCDE}$ ends in 10256 and hence $A = 1$. Thus there is the unique solutions $4 \cdot 102564 = 410256$.