Problem: Prove that every positive integer has a multiple whose decimal representation involves the sequence 20102011.

Solution: (by Kevin Laster, Indianapolis, IN)

If $n$ is a positive integer and $p$ is any other positive integer, then one of integers

$$p+1, p+2, \ldots, p+n$$

is a multiple of $n$.

So given $n$, let $p = 20102011 \times 10^k$ where $k$ is so large that $10^k > n$. Then all of the integers $p+1, p+2, \ldots, p+n$ have decimal representation beginning with 20102011... and one of these is a multiple of $n$.

The problem was also solved by:

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