Cuba 2001, Digit Sums

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> **Example 0.1** (Cuba 2001)
> Find all numbers of the form $n(2n-1)$ with digit sum 2000.

Notice that digit sum preserves the number mod 9. But $2000 \equiv 2 \pmod 9$. Thus

$$n(2n-1) \equiv 2 \pmod 9$$

which has no integer solutions (test the residues). Done.