**A two thousand 9 after decimal point**

 Prove that the first two thousand digits after the decimal point in the value of

$\left(6+\sqrt{35}\right)^{2015}$ are all 9’s.

Hint : If the given number is a man, find his wife.



Let M = $\left(6+\sqrt{35}\right)^{2015}$, W = $\left(6-\sqrt{35}\right)^{2015}$

 Let C =$\left(6+\sqrt{35}\right)^{2015}+\left(6-\sqrt{35}\right)^{2015}$

 = $2\left\{6^{2015}+C\_{2}^{2015}\left(6^{2013}\right)\left(35^{2}\right)+C\_{4}^{2015}\left(6^{2011}\right)\left(35^{4}\right)+…+C\_{2014}^{2015}\left(6\right)\left(35^{2014}\right)\right\}$

 = 2k , an even integer

But $0<6-\sqrt{35}=0.0832…<0.1=10^{-1}$

Hence $0<\left(6-\sqrt{35}\right)^{2015}<10^{-2015}$

* $\left(6+\sqrt{35}\right)^{2015}=2k-\left(6-\sqrt{35}\right)^{2015}$

 which is an integer short of 0.00…01 ( 2014 zeros after the decimal point)

* $\left(6+\sqrt{35}\right)^{2015}$ has at least 2014 number of 9’s after the decimal point.

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