

# ROMANIAN MATHEMATICAL MAGAZINE

**Find the last digit of  $A = 2024^{2025^{2026}} + 2026^{2027^{2028}} + 2028^{2029^{2030}}$**

*Proposed by Nguyen Van Canh-Vietnam*

*Solution by Tapas Das-India*

*Now we need to find the last digit of  $2024^{2025^{2026}}$   
last digit of 2024 is 4  
now,  $4^1$  ends in 4,  $4^2$  ends in 6,  $4^3$  ends in 4  
the pattern is 4, 6 which repeats every 2 powers (1)*

*We know that any positive integer power of an odd number odd 2025 is an odd then  $2025^{2026}$  is an odd number, if exponent is odd, the last digit of  $2024^{2025^{2026}}$  is 4 (using (1)) (2)*

*now we need to find the last digit of  $2026^{2027^{2028}}$   
clearly,  $6^1 = 6, 6^2 = 36, 6^3 = 216, \dots \dots$   
so clearly last digit of  $2026^{2027^{2028}}$  is 6 (3)*

*now we need to find the last digit of  $2028^{2029^{2030}}$   
for this we can focus on the last digit of 2028,  
which is 8 and  
 $8^1 = 8, 8^2$  ends in 4,  $8^3$  ends in 2,  $8^4$  ends in 6  
the pattern repeats every 4 power  
now,  $2029 \equiv 1 \pmod{4}$ ,  $(2029)^{2030} \equiv 1^{2030} \pmod{4}$ ,  $2029^{2030} \equiv 1 \pmod{4}$*

*So, last digit of  $2028^{2029^{2030}}$  is  $8^1 = 8$  (4)*

*Now using result (2), (3), (4) we get  $4 + 6 + 8 = 18$   
last digit of A is 8*