

Monthlies Pool

February 13, 2018

- Determine all pairs of positive integers (m, n) for which

$$(m+n)^3 \mid 2n(3m^2 + n^2) + 8.$$

- For a certain integer value of n , the numbers 4^n and 5^n start with the same digit. Prove that this digit must be either a 2 or a 4.
- Find all prime numbers a and b such that

$$20a^3 - b^3 = 1.$$