

**University of Colorado**  
**Department of Mathematics**  
**Problem of the Month**  
**February 2018**

Let  $x$  be a rational number  $> 1$ . If  $\lim_{n \rightarrow \infty} \{x^n\}$  exists, show that  $x$  must be an integer.

**Note:**  $\{\cdot\} : \mathbb{R} \rightarrow [0, 1)$  denotes the fractional-part function, defined by  $\{x\} = x - \lfloor x \rfloor$ .  
For example,  $\{3.14\} = 0.14$ .