

1. Simply the Banach matchbox sum $\sum_{k=0}^n \binom{n+k}{k} / 2^k$ to get an exponent.
2. Every day Bob buys either a candy for \$1 or a sundae for \$2. There are two different flavors of sundae, but only one kind of candy. If he has n dollars, in how many ways can he spend the money?
3. Let $k > 2$, and $n \geq 0$, be two integers. Show that n is a multiple of k if and only if F_n is a multiple F_k .
4. Prove the Dirichlet theorem on Diophantine approximation that for any real number r and any integer $n > 1$ there exist integer p, q with $0 < q < n$ such that $|p - qr| \leq 1/n$.
5. Show that the dual of every bipartite planar map has an Eulerian walk.
6. A mouse eats its way through a $3 \times 3 \times 3$ cube of cheese by tunneling through all of the 27 units subcubes. If it starts at one corner and always moves on to an uneaten subcube, can it finish at the center of the cube?
7. Show that a tree has at most one perfect matching.
8. There are seven girls in a dorm and everyday only three of them take a walk and walk together. Is it possible to make a plan such that each girl strolls with each other exactly once a week, and why?
9. Which Fibonacci numbers terminate in the ones digit as their subscripts?