## Tiebreakers

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- 1. A large point contains infinitely many lily pads labelled  $1, 2, 3, \ldots$ , placed in a line, where for each k, lily pad k + 1 is one unit to the right of lily pad k 1 for the right of line pad k 1 fo lily pad 100. Each minute, if the frog is at lily pad n, it hops to lily pad n+1 with probability  $\frac{n-1}{n}$ , and hops all the way back to lily pad 1 with probability  $\frac{1}{n}$ . Let N be
- 2. A cat is tied to one corner of the base of a tower. The base forms an equilateral triangle of side length 4 m, and the cat is tied with a leash of length 8 m. I is the area of the region accorrible. are positive integers such that m and n are relatively prime, and  $\ell$  is squarefree, what is the value of  $m + n + k + \ell$ ? mating # # 'S PS

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.. val 3. Compute withthe start to the  $\sum_{n=1}^{\infty} \left( \frac{1}{n^2 + 3n} - \frac{1}{n^2 + 3n + 2} \right)$ 

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4. Find the sum of the real roots of  $f(x) = x^4 + 9x^3 + 18x^2 + 18x + 4$ .

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面前加快新林谱梯 5. Let a, b, c, d, e be the roots of  $p(x) = 2x^5 - 3x^3 + 2x - 7$ . Find the value of  $(a^3 - 1)(b^3 - 1)(c^3 - 1)(d^3 - 1)(e^3 - 1)$ o. Myittitti 新林 著 induitate # 3