$$P(head) = P(tail) = 0.5$$

Then the probability p_n

$$p_n = \left(P(tail)\right)^{n-1} * P(head) = \mathbf{0.5^n}$$

So the probability that the game ends on the n^{th} flip is $\boldsymbol{p_n = 0.5^n}$

The probability that the winner is the first player is:

$$P(first\ player\ wins) = 0.5 + 0.5^3 + 0.5^5 + \cdots = \sum_{i=0}^{\frac{n\text{-}1}{2}} 0.5^{2i+1} =$$

$$= 0.5 \sum_{i=0}^{\frac{n-1}{2}} 0.25^i$$

If $n \to \infty$ the series

$$0.5 \sum_{i=0}^{\infty} 0.25^i$$

converges to

$$\frac{1}{2} * \frac{1}{1 - \frac{1}{4}} = \frac{1}{2} * \frac{4}{3} = \mathbf{\frac{2}{3}}$$

Therefore, the probability that the winner is the first player is $\mathbf{\frac{2}{3}}$