Lotto 649

4 marks

In class, a time scale was used to indicate the average time it would take to first win Lotto 649, purchasing 1 ticket per weekly draw. Assume that a winning ticket is one which matches the 6 numbers drawn from 1 to 49.

a. *(1 mark)* Suppose p is the probability of winning the grand prize. Write down the value for p for Lotto 649.

   $\frac{1}{13983816}$

b. *(1 mark)* Write down the probability of winning (**for the first time**) on the nth draw (i.e. losing on the first $n-1$ draws).

   $(\frac{13983815}{13983816})^{n-1} * \frac{1}{13983816}$

c. *(1 mark)* Determine the expected number of draws you must play (1 ticket each draw) before winning for the first time.

   13983816, as each draw follows a bernoulli(1,1/13983816) distribution, then nth draw is a win follows Geometric(1/13983816) distribution, so expected number of draws is 1/p=13983816

d. *(1 mark)* Show how the average time to win Lotto 649 when playing 1 ticket per weekly 649 draw turns into the long wait given for the Homo sapiens example (as described in the slides)

   13983816*7/365.25=267999

   if a person start buying 649 weekly starting from the first appearance of Homo neanderthalensis (267999 years ago), it's expected to win the grand prize some time around this year.