EXAM P QUESTIONS OF THE WEEK

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Week of March 5/07

The Toronto Blue Jays baseball team holds a Children's Hospital Day. The Blue Jays will donate $100,000 for each home run hit after the 2nd home run in the game. The team's model for the number of home runs hit in the game is Poisson with a mean of 4. Find the expected amount that the Blue Jays will donate.

The solution can be found below.

Week of March 5/07 - Solution

N denotes the number of home runs hit in the game. $E[N] = 4$ and N has a Poisson distribution. The amount donated X (multiples of 100,000) can be summarized as follows: Define Y to be $Y = N - X$.

N	0	1	2	3	4	5	...
X	0	0	0	1	2	3	...
Y	0	1	2	2	2	2	...

We know that $X + Y = N$ so that $E[X] + E[Y] = E[N] = 4$.
But we also can see that Y can only be 0, 1 or 2, and
$P(Y = 0) = P(N = 0) = e^{-4}$, $P(Y = 1) = P(N = 1) = 4e^{-4}$
and $P(Y = 2) = P(N \geq 2) = 1 - P(N = 0, 1) = 1 - 5e^{-4}$.
Therefore,
$E[X] = 4 - E[Y] = 4 - (1)(4e^{-4}) - (2)[1 - 5e^{-4}] = 2.11$
and the expected amount paid by the Blue Jays is 211,000 .