Homework_1

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20 January 2018

Review 1

R1. You flip what you think is a fair coin ten times and get heads every time.

(a) (1pt) What is the probability of this result if the coin's true probability of landing heads p = 0.5

$Pr(k; n, p) = Pr(10; 10, 0.5) = \binom{10}{10} 0.5^{10}(1 - (0.5))^{10-10} = 0.0009765625$

(b) (1pt) What p would make this outcome (ten out of ten heads) have probability 0.01

$Pr(k; n, p) = Pr(10; 10, P) = \binom{10}{10} p^{10}(1 - p)^{10-10} = p^{10} = 0.01$

$p^{10} = 0.01 => 10 * ln(p) = ln(0.01) => ln(p) = \frac{ln(0.01)}{10} => ln(p) = -0.460517$

$\therefore p = 0.6309573$

(c) (1pt) What is the mean of a binomial distribution with n trials and outcome probability p? Simplify as much as possible.

$\mu = \sum k\binom{n}{k} p^k(1 - p)^{n-k} = \sum k\frac{n!}{k!(n-k)!} p^k(1 - p)^{n-k} = \sum \frac{n!p^k(1-p)^{n-k}}{(k-1)!(n-k)!}$