

Statistiek voor BMT/KI/Inf (Külske) Midexam Group B

Monday 10 December 2007, 13h15 – 14h40

1. **(1 point)** Let A and B be any two events. Suppose that $P(A) = 0.3$, $P(B) = 0.7$ and $P(A \cup B) = 0.8$.

What is the probability that both events occur?

2. **(2 points)** You flip a coin ten times. How big is the probability to get precisely 3 heads?

How big is the conditional probability to get precisely 3 heads if you already know that you did not get more than 5 heads?

3. **(3 points)** Look at the function g defined by $g(y) = \frac{1}{3}e^{-\frac{y}{3}}$ for $y \geq 0$ and zero else.

If a random variable Y has g as a pdf (probability density), what is the cdf (distribution function) and pdf (probability density) of $Y^{\frac{1}{3}}$?

4. **(3 points)** Three persons A , B , and C are living together in an apartment. They are discussing who has to do the cleaning today.

Person A proposes the following procedure to solve the problem: He flips a coin until the first time a head appears. If this happened at the second, fourth, sixth, ... trial he agrees to do it. If it happened at the first, third, fifth, ... time he is out. Then again a coin is flipped. If it shows head at this time, then B must do it, if not, C must do it.

Is this procedure fair, that is are A , B , C all chosen with the same probability?

Hint: Recall the formula for the geometric infinite sum $\sum_{n=0}^{\infty} q^n = \frac{1}{1-q}$ for $|q| < 1$.