HOME ASSIGNMENT 1 (18.05, SPRING 2007)

Read: *Dekking et al.* Chapters 1-3.

Solve: Problems 2.2, 2.3, 2.6, 2.9, 2.18, 3.5, 3.6, 3.10, 3.12, 3.16. (Each problem is 10 points.)

1. (10 points) A fair coin is flipped 9 times. Let x be the number of Heads and let y be the number of Tails. Compute $P(x = 0)$, $P(x = 1)$, $P(x < y)$, $P(x^2 + y^2 = 10)$.

2. (20 points) Let $(a_1, \dots, a_n)$ be a random permutation of $\{1, \dots, n\}$. Suppose $n \geq 4$. Compute:

a) $P(a_1 + a_2 = n)$, $P(a_1 \cdot a_2 = 2)$, $P(a_1 < a_2 < a_3)$, $P(a_1 < a_2 > a_3)$.

b) $P(a_1 + a_2 = n \mid a_1 \cdot a_2 = 2)$, $P(a_1 + a_2 = n \mid a_3 \cdot a_4 = 2)$, $P(a_1 + a_2 = 5 \mid a_3 + a_4 = 5)$, $P(a_1 - a_2 = 1 \mid a_n = 1)$.

3. (20 points) Let a, b be two numbers chosen independently at random from $\{1, \dots, 10\}$. Which pairs of the following events are independent? (you need to check all 6 pairs)

$A = \{a \leq 5\}$, $B = \{a \neq b\}$, $C = \{a + b \leq 6\}$, $D = \{a \cdot b \geq 25\}$

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This HA is due Wednesday February 21 at 4 pm. in 2-108 (UMO)
Make sure to read collaboration policy on the course web page.