Sheet 2

Free University of Berlin, WS 2007/08
Utz J. Pape · Martin Vingron

Assignments for the lecture PSSA
working period: 31.10.2007 - 07.11.2007

Exercise 3 (Moments and Variance)**.** Calculate the first three moments and the variance for the following random variables:

- X with density function

$$f_X(x) := \begin{cases} \frac{1}{b-a} & x \in [a,b] \\ 0 & x \notin [a,b] \end{cases}$$

- Y with density function

$$f_Y(y) := \frac{\delta(y)}{3} + \frac{\delta(y-1)}{4} + \frac{\delta(y-3)}{6} + \frac{\delta(y-5)}{4}$$

  where $\delta(t)$ is 1 if $t = 0$ and 0 otherwise.

Exercise 4 (Expected Value and Variance)**.** Derive the expected value and the variance for the following random variables:

- X is Binomial distributed with parameters p for probability of success and n the number of trials.
- Y is Poisson distributed with parameter λ.
- Z is Normal distributed with parameters μ and σ.

Exercise 5 (Background Model)**.** Compute the count distribution assuming position independence for the background model as well as for the count distribution in a uniform, AT-rich, and GC rich background model for the words ACGT, ACAC, ATAT, and GGGG in a sequence of length 5000bp. Compare the results and give an interpretation.