**CS321: Numerical Methods in Comp Mol Bio**

**Homework 4**

Due: Thursday, Sept 22 2005 at the begining of the section

**Problem 1**
Let $X$ be a Uniform random variable on the interval $(0,10)$.
Find the mean and variance of $X$.
Calculate the following probabilities:

$P(|X - 5| ≥ 2)$

$P(|X - 5| ≥ 4)$

$P(|X - 5| ≥ 5)$

Using the Chebyshev’s inequality find an upper bound for the above probabilities.

**Problem 2**
Let $X$ be an Exponential random variable with $\lambda = 1$, i.e. $f_X(x) = \begin{cases} e^{-x} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$

Find the mean and variance of $X$.
Use Markov’s inequality to bound $P(X ≥ 3)$.
Use Chebyshev’s inequality to bound $P(X ≥ 3)$.
Calculate the actual value of $P(X ≥ 3)$.