CS 321: Numerical Methods in Computational Molecular Biology

Homework 1

Due: Thursday, Sept 1 2005 at the beginning of the section

Problem 1

Let $f(x)=Ae^{-2x}$ for $0<x<2$ ($f(x)=0$ for any other value of x) be a p.d.f.

- For what value of A is $f(x)$ a true density function?
- Using the value for A calculated above, what is the probability $P(-2\leq x\leq 2)$?

Problem 2

Suppose that X is uniformly distributed on the interval (-2,3). Let $Y = X^2$

- Find the density function (p.d.f) of Y.
- Find the distribution function (c.d.f) of Y.

Problem 3

Suppose that X and Y are independent random variables and each is uniformly distributed on the interval (0,1). Let $V = X - Y$ and let $W = X + Y$

- Find the distribution function (c.d.f) of V.
- Find the distribution function (c.d.f) of W.

Problem 4

Suppose that X and Y are independent random variables and each is of exponential distribution with mean ⅓ , i.e. $f(x) = 3e^{-3x}$ and $f(y) = 3e^{-3y}$. Let $V = X + Y$, let $W = min(X, Y)$ and let $Z = max(X, Y)$.

- Find the distribution function (c.d.f) of V.
- Find the distribution function (c.d.f) of W.
- Find the distribution function (c.d.f) of Z.