Statistics for laboratory scientists

Homework problems for lecture 9

1. Suppose $X \sim \text{normal}(\text{mean}=5, \text{SD}=3)$. Calculate the following. (Try these both using R and a table.)

   a. $\Pr(X < 6)$
   b. $\Pr(X > 0)$
   c. $\Pr(0 < X < 5)$
   d. $\Pr(2 < X < 8)$
   e. $\Pr(|X - 5| > 2)$

2. Suppose $Y \sim \text{normal}(\text{mean}=200, \text{SD}=18)$. Calculate the following. (Again, try these both using R and a table.)

   a. $\Pr(Y > 250)$
   b. $\Pr(180 < Y < 220)$
   c. $\Pr(|Y - 180| > 20)$

3. [problem 6.3 in Sokal & Rohlf, pg 125] Assume that the petal length of a population of plants of species $X$ is normally distributed with mean=3.2cm and SD=0.8cm. What proportion of the population would be expected to have a petal length:

   a. Greater than 4.5cm?
   b. Greater than 1.78cm?
   c. Between 2.9 and 3.6cm?

4. Suppose $X$ and $Y$ are independent, $X \sim \text{binomial}(n=5, p=0.1)$, and $Y \sim \text{binomial}(n=5, p=0.4)$. Calculate the following.

   a. $E(X+Y)$
5. Suppose $X_1, X_2, X_3, \ldots, X_{10}$ are independent and identically distributed (iid), with mean=3 and SD=3. Calculate the following.

a. $E(X_1 + X_2 + \ldots + X_{10})$

b. $SD(X_1 + X_2 + \ldots + X_{10})$

c. $E[(X_1 + X_2 + \ldots + X_{10})/10]$

d. $SD[(X_1 + X_2 + \ldots + X_{10})/10]$

b. $SD(X+Y)$

c. $E[(X+Y)/2]$

d. $SD[(X+Y)/2]$

e. $E(X - Y)$

f. $SD(X - Y)$