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Statistics for laboratory scientists

Homework problems for lecture 9

1. Suppose X ~ normal(mean=5, 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 ~ normal(mean=200, 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 ~ binomial(n=5, p=0.1), and Y ~ binomial(n=5, p=0.4). Calculate the following.

   a. $E(X+Y)$

b. SD(X+Y)

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

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

e. E(X - Y)

f. SD(X - Y)

5. Suppose X_1, X_2, X_3, ..., X_{10} are independent and identically distributed (iid), with mean=3 and SD=3. Calculate the following.

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

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

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

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

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