

## R resources

- Download R by typing "R download" in google.

## Using R to calculate probabilities

- To compute  $P(X=x)$  when  $X$  is Binomial distribution with parameters  $n$  and  $p$ , type `dbinom(x,n,p)`

**Example:** `dbinom(3,10,0.4)`; it calculates  $P(X=3)$  when  $X$  is Binomial with parameters 10 and 0.4. Compare with calculation using the formula for the Binomial probabilities.

- To compute  $P(X \leq x)$  when  $X$  is Binomial distribution with parameters  $n$  and  $p$ , type `pbinom(x,n,p)`

**Example:** `pbinom(3,10,0.4)`; it calculates  $P(X \leq 3)$  when  $X$  is Binomial with parameters 10 and 0.4. Compare with the Binomial table.

**Exercise:** Suppose  $X$  is Binomial with  $n=20$  and  $p=0.2$ . Use R and compute  $P(4 < X < 6)$  and  $P(4 < X \leq 6)$ .

- To compute  $P(X=x)$  when  $X$  is Poisson with parameter  $\mu = \lambda * t$ , type `dpois(x,mu)`

**Example:** `dpois(2,3)`; it calculates  $P(X=2)$  when  $X$  is Poisson with parameter  $\mu=3$ . Compare with the Poisson table.

- To compute  $P(X \leq x)$  when  $X$  is Poisson with parameter  $\mu = \lambda * t$ , type `ppois(x, mu)`

**Example:** `ppois(2, 3)`; it calculates  $P(X \leq 2)$  when  $X$  is Poisson with parameter  $\mu = 3$ . Compare with the Poisson table.

- To compute  $f(x)$  when  $X$  is Normal with parameters  $\mu$  (mean) and  $\sigma$  (standard deviation), type `dnorm(x, mu, sigma)`

- To compute  $P(X \leq x)$  when  $X$  is Normal with parameters  $\mu$  (mean) and  $\sigma$  (standard deviation), type `pnorm(x, mu, sigma)`

**Example:** `pnorm(2, 0, 1)`; it calculates  $P(X \leq 2)$  when  $X$  is standard Normal. Compare with the normal table.

**Example:** `pnorm(2, 1, 2)`; it calculates  $P(X \leq 2)$  when  $X$  is Normal with mean 1 and standard deviation 2. Compare with the calculations via the standardization procedure.

**Exercise:** Suppose  $X$  is Normal with  $\mu = 3$  and  $\sigma = 5$ . Use R and compute  $P(X < 2)$ ,  $P(X \geq 2)$  and  $P(|X| \geq 2)$ .