

APPLIED MATHEMATICS 21/07/2016

1) Let  $X$  be a binomial random variable with  $\mathbb{E}(X) = 7$  and  $\text{Var}(X) = 2.1$ . Find:

- (a)  $\mathbb{P}(X = 4)$ ;
- (b)  $\mathbb{P}(X > 12)$ .

2) An electric scale gives a reading equal to the true weight plus a random error that is normally distributed with mean  $\mu = 0$  and standard deviation  $\sigma = 0.1$  mg. Suppose that the results of five successive weighings of the same object are as follows:

3.142, 3.163, 3.155, 3.150, 3.141 mg.

- (a) Determine a 95 percent confidence interval estimate of the true weight.
- (b) Determine a 99 percent confidence interval estimate of the true weight.

3) A public health official claims that the mean home water use is 350 gallons a day. To verify this claim, a study of 20 randomly selected homes was instigated with the result that the average daily water uses of these 20 homes were as follows:

340 344 362 375 356 386 354 364 332 402  
340 355 362 322 372 324 318 360 338 370.

Do the data contradict the official's claim?