Name:_____   Date:_____

Example of Tasks for Test 1
Biostatistics I

Task 1. Work with *mice* data. The data can be taken either from Moodle or downloaded from Internet http://edu.sablab.net/biostat/data/mice.xlsx

Calculate the *mean*, *median* and *standard deviation* for the ending weight of female mice.

Task 2. Pancreatic ductal adenocarcinoma is called a "silent killer". Sadly, only 20% of the people with this diagnosis survive for 1 year (and <5% survive for 5 years). Five patients at hospital have diagnosed to have pancreatic adenocarcinoma. Calculate the probability for at least 2 of them to survive over 1 year period.

Task 3. The average weight of 60-day mice (*Mus musculus*) is 20g, with a standard deviation over population equal to 3g. You are ordering a mouse from animal facility for you experiment. Calculate the probability for this mouse to be lighter than 17g. Assume that weight distribution is normal.

Task 4. You are counting *Rana temporaria* in the forest. On average you know that you can find 6 frogs per hour. What is the probability to find no frogs in the next 20 minutes?

Task 5. Assume you have performed measurements of the lifetime of *Caenorhabditis elegans*. After observation of 9 nematodes you get an average lifetime of 15.4 days. Standard deviation of nematode lifetime was 2.7 days. Calculate the standard deviation of the average lifetime (i.e. standard error).

Task 6. Identify the class of distributions and find expected value (mean) and standard deviation:

$$f(x) = \sqrt{\pi}e^{-x\sqrt{\pi}}$$

$$f(x) = \frac{1}{\sqrt{\pi}}e^{-(x+3)^2}$$

$$f(x) = 0.125 \cdot e^{-\frac{(x-12.8)^2}{20.48}}$$

Task 7. Your colleague performed 3 series of 5 replicate experiments measuring variable X. Standard errors obtained were: 0.6, 0.3 and 0.4. Calculate:
- average standard error over 5 experiments;
- estimate for the standard deviation of X (i.e. for experimental observations, not mean).

Task 8. Identify distributions to describe the following random variables:
a) You are tossing 5 coins and count number of "heads"
b) Number of interactions b/w an enzyme and a substrate in a cell during 1 ms
c) Your wallet contains 3 €50 bills and 5 €10 bills. You randomly choose 4 bills and consider the outcome as a random variable.