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.modas.lu/data

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 error** of a lifetime (i.e. standard deviation of the average lifetime).

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. You and two of your colleagues performed in total 3 series of 5-replicate experiments measuring a variable X. Standard errors obtained in these 3 series were: 0.6, 0.3 and 0.4. Calculate:

- an average standard error over 5 experiments;
- an estimation of the standard deviation of X (i.e. for experimental observations, not for 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.