

3 rd set of SAS assignments

1. Create density function of a normally distributed variable

- i) Create a data set with values of the density function of a normal distribution

$$f(x|\mu, \sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-1/2[(x-\mu)^2/\sigma^2]}$$

with parameters $\mu = 0.8$ and $\sigma^2 = 0.6$. Therefore, use a do loop in a **data step**.

DO *x=start* TO *end* BY *step*;

CALCULATE VALUES OF A NORMAL DENSITY FUNCTION

output;

END;

Let x run from -4 to 4 in steps of 0.01 . Label the created variable.

- ii) Read out the maximum value of the density function into a macro variable named *max* (Use PROC Means or PROC SQL). Then, add 0.1 to the rounded value of *max*. Use the following statement:

```
DATA _NULL_;
```

```
call symput('max',round(max_normal,0.1)+0.1);
```

```
RUN;
```

The word `_NULL_` appears in the DATA statement instead of a SAS data set name. `_NULL_` is a special keyword that tells SAS not to bother making a new data set. The SYMPUT command creates macro variables either from variables in a data step or from previous macro variables. Here, the variable *max_normal* is rounded and read into the macro variable *max*.

Print the value contained in this variable into the log window (use the PUT command).

- iii) Plot the created density function. Use the **goptions** provided for last week's assignment sheet. Label the axis and save the plot as an Encapsulated Postscript (eps). The range of the vertical axis should be from **0** to **max**.
- iv) Create values from a standard normal distribution ($\mu = 0$ and $\sigma^2 = 1$) and plot them together with the values from Task (i) into a graph. Use the **symbol** options to create differently coloured lines for the plots.
- v) Create a SAS **MACRO** for the steps i) to iv) with the arguments `%MACRO(path, dataset, startx, endx, step, mu, sigma)`.
path denotes the path where the .eps graph is written out to, *dataset* is any name for your data set, *startx* (*endx*) are any starting (ending) values for which to compute the density function and *mu* and *sigma* are the parameters of your normal distribution.