# Running Rapp and editing Rapp programs

2018-08-17, Stig Rosenlund

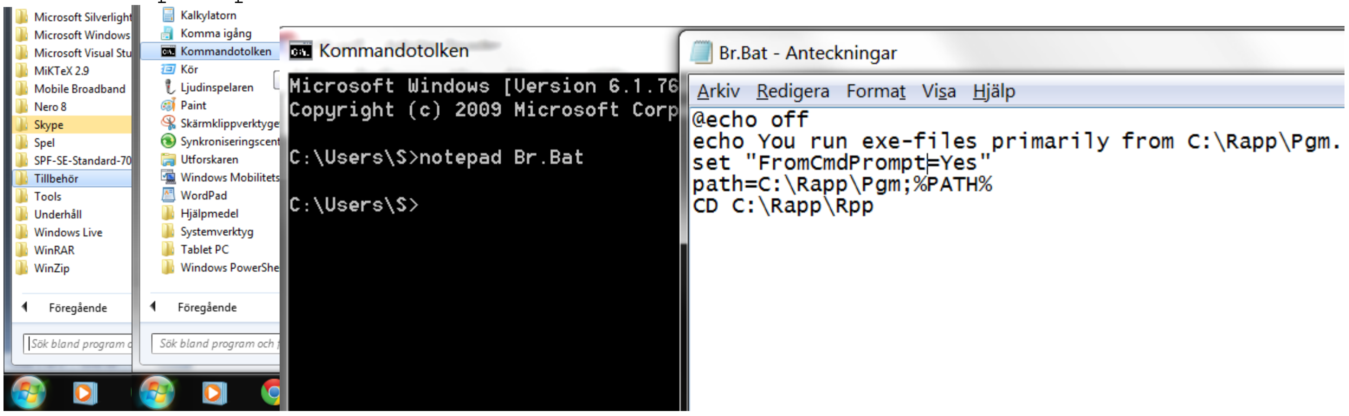
We assume you have created the folder C:\Rapp from the downloaded zipfile Rapp.zip or Rapp.zipx.

## 1. Run and edit Rapp.Exe without using Rappmenus.Exe

### *1.A. Running Rapp from the command prompt*

<u>Initiation: create an environment at the command prompt</u>
Startmenu / All programs / Accessories / Command prompt

I illustrate how to do it below. In Swedish Accessories is Tillbehör and Command prompt is Kommandotolken.



```
Microsoft Windows [Version 6.1.76
Copyright (c) 2009 Microsoft Corp

C:\Users\S>notepad Br.Bat

C:\Users\S>
```

```
@echo off
echo You run exe-files primarily from C:\Rapp\Pgm.
set "FromCmdPrompt=Yes"
path=C:\Rapp\Pgm;%PATH%
CD C:\Rapp\Rpp
```

Copy the five lines below.

```
@echo off
echo You run exe-files primarily from C:\Rapp\Pgm.
set "FromCmdPrompt=Yes"
path=C:\Rapp\Pgm;%PATH%
CD C:\Rapp\Rpp
```

At the prompt >, write

```
Notepad Br.Bat
```

Answer Yes to Create new file?

Paste the five lines into new file Br.Bat. Close <u>up right</u> and save.

Place a shortcut to Command prompt on the desktop or the Startmenu.

<u>Daily use</u>
When you are going to run a Rapp program, go into the Command prompt and write Br and press Enter.

For example there is a simple program C:\Rapp\Rpp\Helloworld.Rpp. Run it at the Command prompt by

```
Rapp Helloworld
```

### *1.B. Running Rapp from Windows Explorer*

Initiation: Associate extent .Rpp to Rapp.Exe in Windows Explorer
Either run Adapt Exe or

Click or rightclick in Windows Explorer on a Rapp-program with extent .Rpp (for example Init.Rpp), select Open / Choose Program / Browse / locate Rapp.Exe and tick Always use this program.

Daily use
Run a Rapp-program by doubleclick or click+return in Windows Explorer. When its done, press enter to exit Rapp.

**Advantages and disadvantages of running Rapp from the command prompt**
Advantages

1. It will always work, while the association in Windows Explorer might get lost and be difficult to restore due to authorization problems.

2. The working directory will always be C:\Rapp\Rpp. Some Rapp programs presume this. In Windows Explorer it might be something else.

3. As Rapp developer, I can make a sequence of versions of Rapp for testing some new feature, and run them quickly. For example I might make t1.exe, which is Rapp with some change, and run it in the command prompt with t1 tst1. That is inconvenient in Windows Explorer.

Disadvantages

1. It takes some time to write a long Rapp program name.

2. It has a feeling of being old and not elegant.

Disadvantage no 2 is just superficial, though.

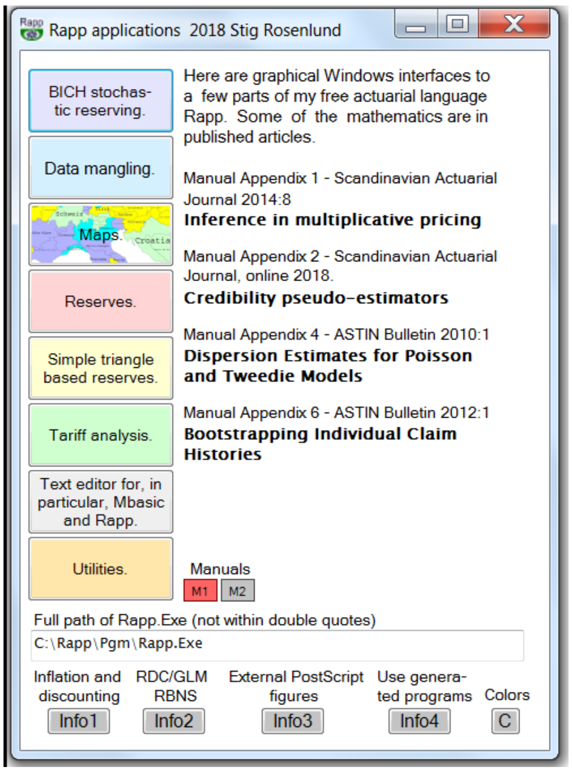
### *1.C. Editing Rapp programs*

To write Rapp-programs you can use a text editor you're used to, such as the SAS source editor, Wordpad or Notepad. I recommend SPF Source Editor from CTC Command Technology Corporation. It costs some money, presently $88 for perpetual use. Web site:
http://www.commandtechnology.com

## 2. Run and edit in Rappmenus.Exe.

Besides these ways there is Rappmenus.Exe, which generates and runs Rapp programs for certain applications dynamically. In 2017 and 2018 it has been amended with a text editor, suitable for any text file. Rapp programs can be executed with a Run button. SPF has more capabilities, but takes some time to learn.

In Rappmenus, choose "Text editor for, in particular, Mbasic and Rapp." in the menu below.



Rapp applications 2018 Stig Rosenlund

Here are graphical Windows interfaces to a few parts of my free actuarial language Rapp. Some of the mathematics are in published articles.

Manual Appendix 1 - Scandinavian Actuarial Journal 2014:8
**Inference in multiplicative pricing**

Manual Appendix 2 - Scandinavian Actuarial Journal, online 2018.
**Credibility pseudo-estimators**

Manual Appendix 4 - ASTIN Bulletin 2010:1
**Dispersion Estimates for Poisson and Tweedie Models**

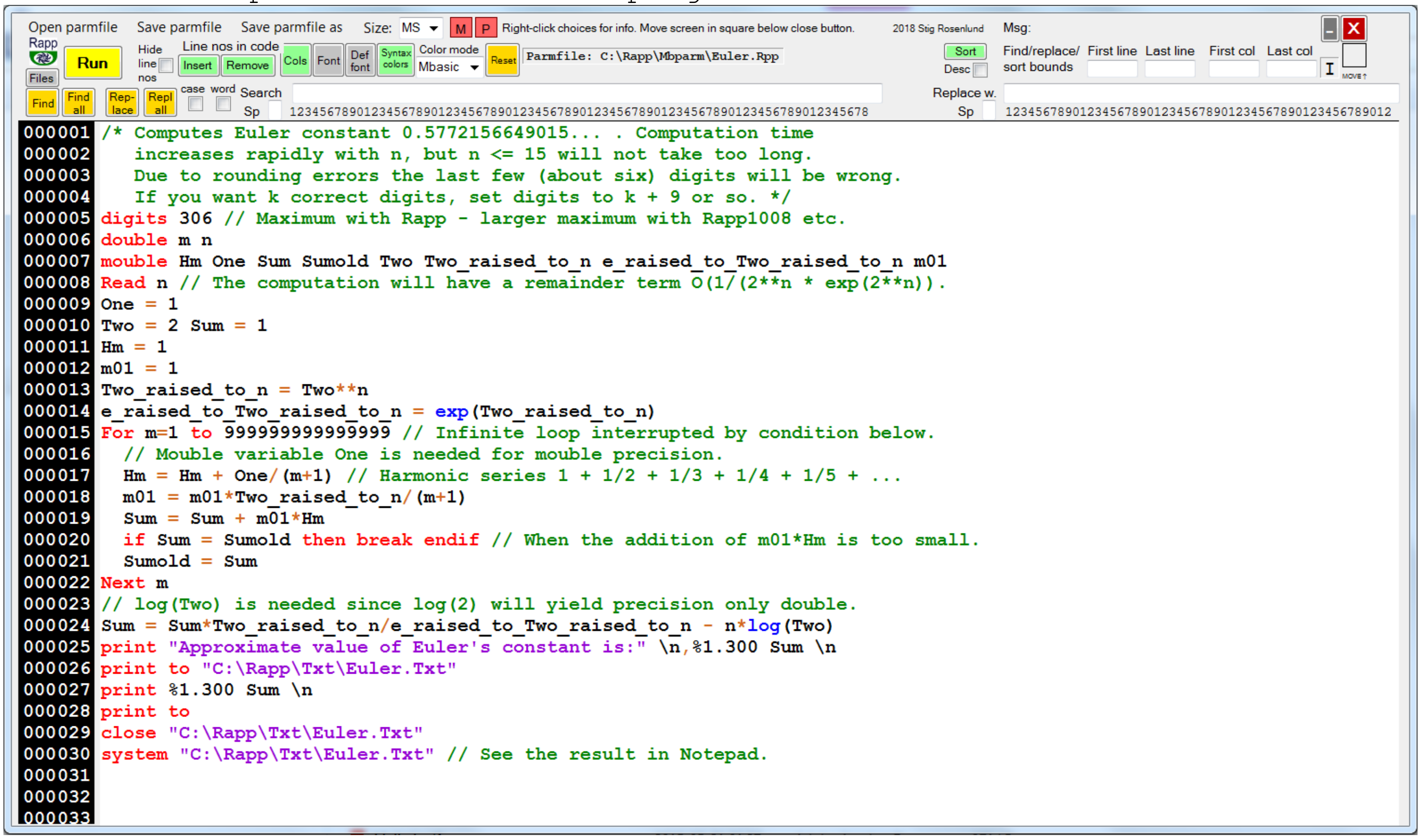
Manual Appendix 6 - ASTIN Bulletin 2012:1
**Bootstrapping Individual Claim Histories**

BICH stochastic reserving.
Data mangling.
Maps.
Reserves.
Simple triangle based reserves.
Tariff analysis.
Text editor for, in particular, Mbasic and Rapp.
Utilities.
Manuals
M1
M2
Inflation and discounting
Info1
RDC/GLM RBNS
Info2
External PostScript figures
Info3
Use generated programs
Info4
Colors
C

Full path of Rapp.Exe (not within double quotes)
C:\Rapp\Pgm\Rapp.Exe

The editor has coloring of special syntax words in Mbasic (part of Rapp, see Proc Mbasic in the manual) and Rapp in general. There is also syntax-sensitive coloring for C and for some of the keywords of SAS (those I used at Länsförsäkringar). I have emulated some of the functionality of SPF. An Mbasic- or general Rapp-program is run from the editor with a button. There are some useful template parmfiles to get you started in the folder Mbparm of the zip files Rapp.zip and Rapp.zipx. Place this folder on your computer as C:\Rapp\Mbparm. Find, replace and sort are extensively implemented. There are special features which facilitate debugging your Mbasic-program.

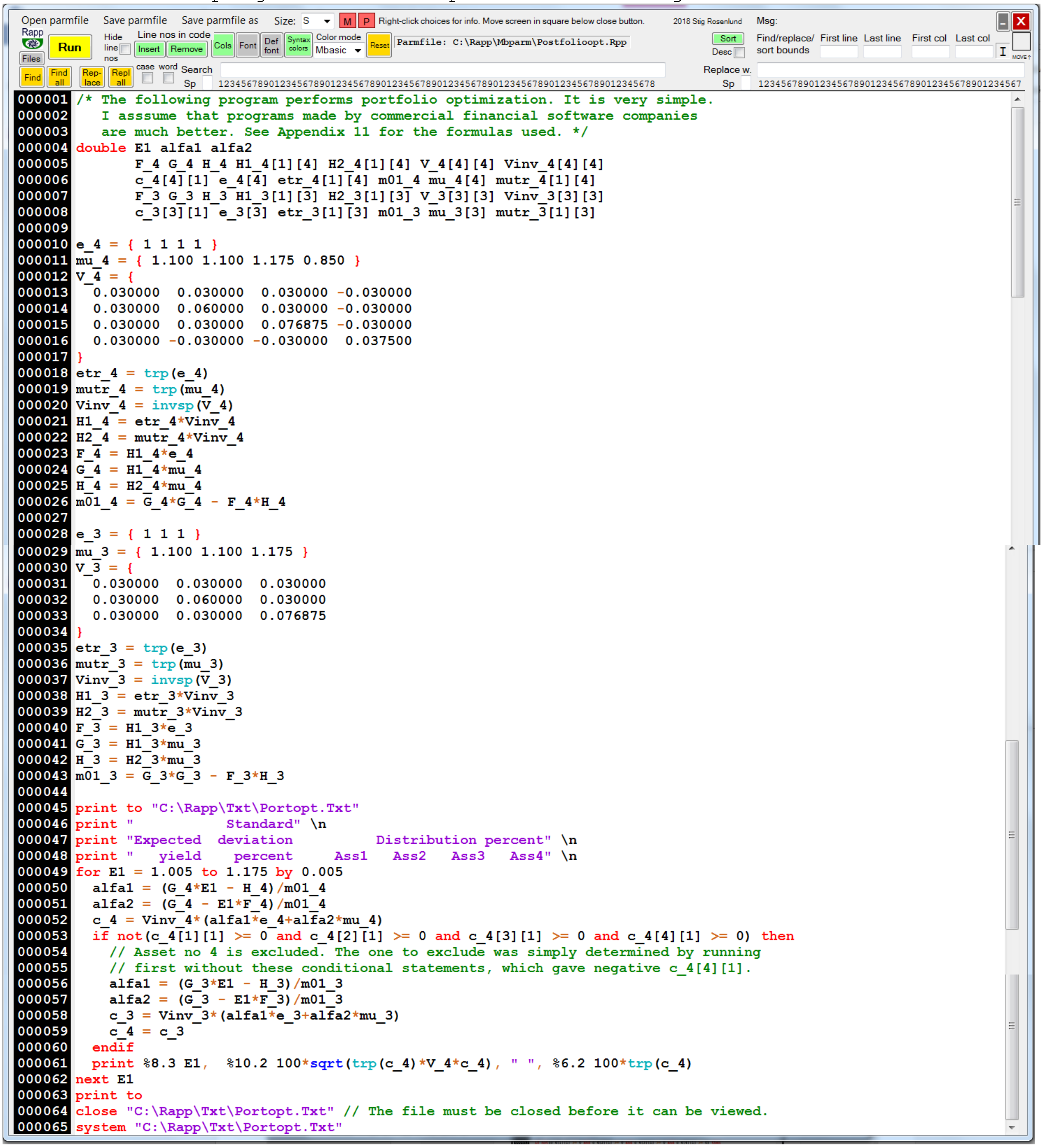
Below an example where an Mbasic-program is in the edit screen.



Parmfile: C:\Rapp\Mbparm\Euler.Rpp

```
/* Computes Euler constant 0.5772156649015... . Computation time
   increases rapidly with n, but n <= 15 will not take too long.
   Due to rounding errors the last few (about six) digits will be wrong.
   If you want k correct digits, set digits to k + 9 or so. */
digits 306 // Maximum with Rapp - larger maximum with Rapp1008 etc.
double m n
mouble Hm One Sum Sumold Two Two_raised_to_n e_raised_to_Two_raised_to_n m01
Read n // The computation will have a remainder term O(1/(2**n * exp(2**n)).
One = 1
Two = 2 Sum = 1
Hm = 1
m01 = 1
Two_raised_to_n = Two**n
e_raised_to_Two_raised_to_n = exp(Two_raised_to_n)
For m=1 to 999999999999999 // Infinite loop interrupted by condition below.
  // Mouble variable One is needed for mouble precision.
  Hm = Hm + One/(m+1) // Harmonic series 1 + 1/2 + 1/3 + 1/4 + 1/5 + ...
  m01 = m01*Two_raised_to_n/(m+1)
  Sum = Sum + m01*Hm
  if Sum = Sumold then break endif // When the addition of m01*Hm is too small.
  Sumold = Sum
Next m
// log(Two) is needed since log(2) will yield precision only double.
Sum = Sum*Two_raised_to_n/e_raised_to_Two_raised_to_n - n*log(Two)
print "Approximate value of Euler's constant is:" \n,%1.300 Sum \n
print to "C:\Rapp\Txt\Euler.Txt"
print %1.300 Sum \n
print to
close "C:\Rapp\Txt\Euler.Txt"
system "C:\Rapp\Txt\Euler.Txt" // See the result in Notepad.
```

Another Mbasic-program. Several parts have been joined.



Parmfile: C:\Rapp\Mbparm\Postfolioopt.Rpp

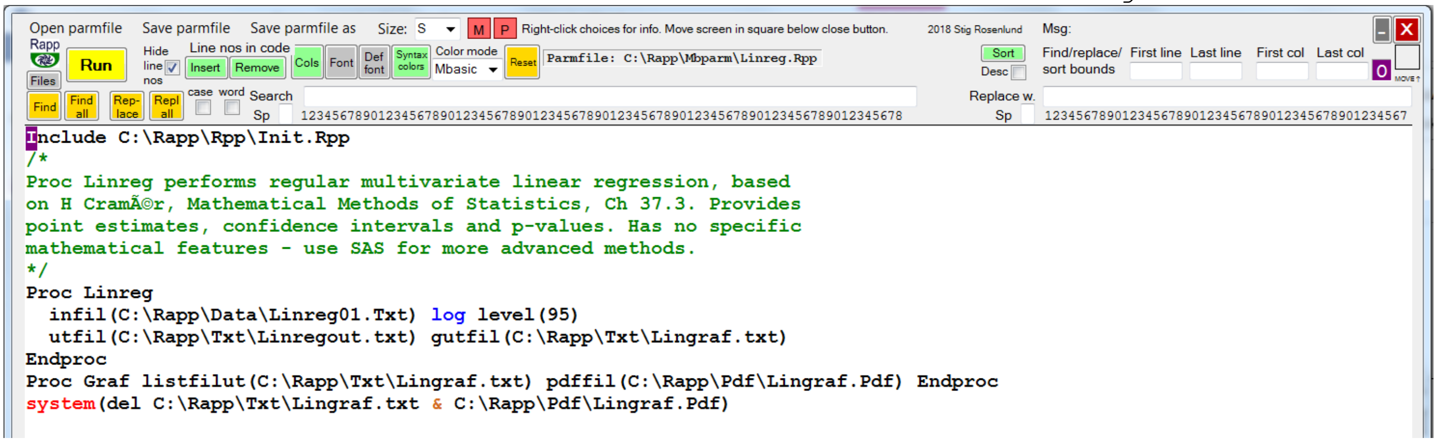
```
/* The following program performs portfolio optimization. It is very simple.
   I asssume that programs made by commercial financial software companies
   are much better. See Appendix 11 for the formulas used. */
double E1 alfa1 alfa2
       F_4 G_4 H_4 H1_4[1][4] H2_4[1][4] V_4[4][4] Vinv_4[4][4]
       c_4[4][1] e_4[4] etr_4[1][4] m01_4 mu_4[4] mutr_4[1][4]
       F_3 G_3 H_3 H1_3[1][3] H2_3[1][3] V_3[3][3] Vinv_3[3][3]
       c_3[3][1] e_3[3] etr_3[1][3] m01_3 mu_3[3] mutr_3[1][3]

e_4 = { 1 1 1 1 }
mu_4 = { 1.100 1.100 1.175 0.850 }
V_4 = {
  0.030000  0.030000  0.030000 -0.030000
  0.030000  0.060000  0.030000 -0.030000
  0.030000  0.030000  0.076875 -0.030000
  0.030000 -0.030000 -0.030000  0.037500
}
etr_4 = trp(e_4)
mutr_4 = trp(mu_4)
Vinv_4 = invsp(V_4)
H1_4 = etr_4*Vinv_4
H2_4 = mutr_4*Vinv_4
F_4 = H1_4*e_4
G_4 = H1_4*mu_4
H_4 = H2_4*mu_4
m01_4 = G_4*G_4 - F_4*H_4

e_3 = { 1 1 1 }
mu_3 = { 1.100 1.100 1.175 }
V_3 = {
  0.030000  0.030000  0.030000
  0.030000  0.060000  0.030000
  0.030000  0.030000  0.076875
}
etr_3 = trp(e_3)
mutr_3 = trp(mu_3)
Vinv_3 = invsp(V_3)
H1_3 = etr_3*Vinv_3
H2_3 = mutr_3*Vinv_3
F_3 = H1_3*e_3
G_3 = H1_3*mu_3
H_3 = H2_3*mu_3
m01_3 = G_3*G_3 - F_3*H_3

print to "C:\Rapp\Txt\Portopt.Txt"
print "                  Standard" \n
print "Expected  deviation          Distribution percent" \n
print "   yield     percent      Ass1    Ass2    Ass3    Ass4" \n
for E1 = 1.005 to 1.175 by 0.005
  alfa1 = (G_4*E1 - H_4)/m01_4
  alfa2 = (G_4 - E1*F_4)/m01_4
  c_4 = Vinv_4*(alfa1*e_4+alfa2*mu_4)
  if not(c_4[1][1] >= 0 and c_4[2][1] >= 0 and c_4[3][1] >= 0 and c_4[4][1] >= 0) then
    // Asset no 4 is excluded. The one to exclude was simply determined by running
    // first without these conditional statements, which gave negative c_4[4][1].
    alfa1 = (G_3*E1 - H_3)/m01_3
    alfa2 = (G_3 - E1*F_3)/m01_3
    c_3 = Vinv_3*(alfa1*e_3+alfa2*mu_3)
    c_4 = c_3
  endif
  print %8.3 E1,  %10.2 100*sqrt(trp(c_4)*V_4*c_4), " ", %6.2 100*trp(c_4)
next E1
print to
close "C:\Rapp\Txt\Portopt.Txt" // The file must be closed before it can be viewed.
system "C:\Rapp\Txt\Portopt.Txt"
```

A Rapp-Program for multivariate linear regression, in Overwrite mode.
"Hide line nos" has been checked to turn off line numbering.

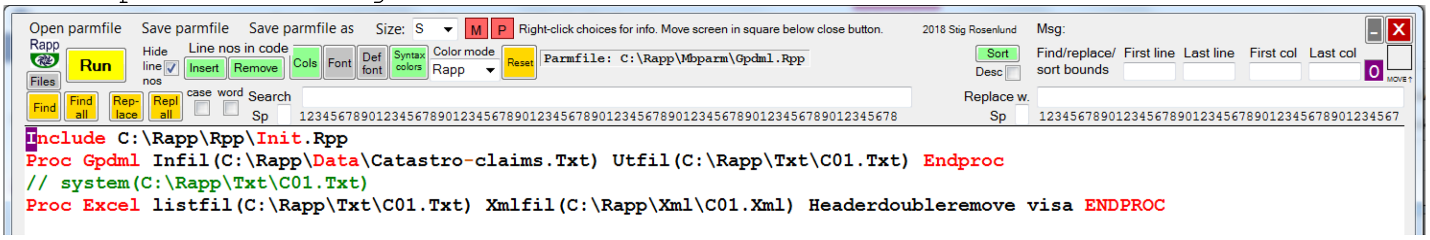


Color mode: Mbasic

Parmfile: C:\Rapp\Mbparm\Linreg.Rpp

```
Include C:\Rapp\Rpp\Init.Rpp
/*
Proc Linreg performs regular multivariate linear regression, based
on H CramÃ©r, Mathematical Methods of Statistics, Ch 37.3. Provides
point estimates, confidence intervals and p-values. Has no specific
mathematical features - use SAS for more advanced methods.
*/
Proc Linreg
  infil(C:\Rapp\Data\Linreg01.Txt) log level(95)
  utfil(C:\Rapp\Txt\Linregout.txt) gutfil(C:\Rapp\Txt\Lingraf.txt)
Endproc
Proc Graf listfilut(C:\Rapp\Txt\Lingraf.txt) pdffil(C:\Rapp\Pdf\Lingraf.Pdf) Endproc
system(del C:\Rapp\Txt\Lingraf.txt & C:\Rapp\Pdf\Lingraf.Pdf)
```

Proc Gpdml for the generalized Pareto distribution.

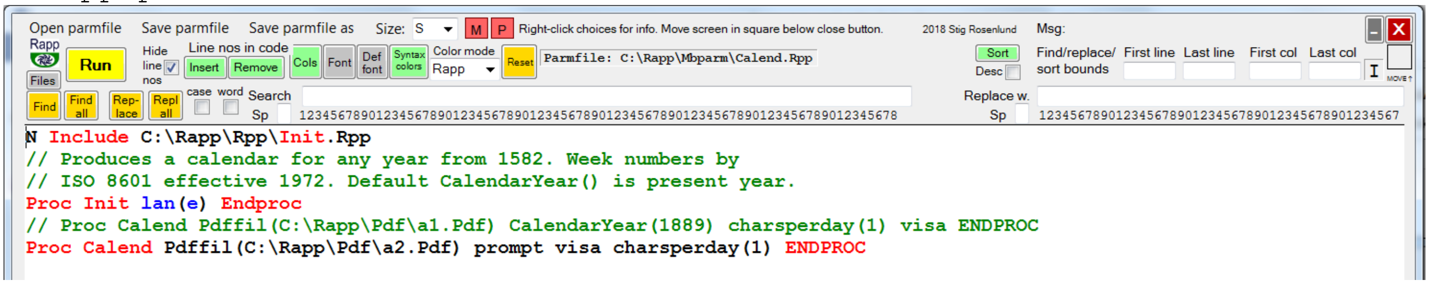


Color mode: Rapp

Parmfile: C:\Rapp\Mbparm\Gpdml.Rpp

```
Include C:\Rapp\Rpp\Init.Rpp
Proc Gpdml Infil(C:\Rapp\Data\Catastro-claims.Txt) Utfil(C:\Rapp\Txt\C01.Txt) Endproc
// system(C:\Rapp\Txt\C01.Txt)
Proc Excel listfil(C:\Rapp\Txt\C01.Txt) Xmlfil(C:\Rapp\Xml\C01.Xml) Headerdoubleremove visa ENDPROC
```

A Rapp procedure outside the area of mathematical statistics.



Color mode: Rapp

Parmfile: C:\Rapp\Mbparm\Calend.Rpp

```
N Include C:\Rapp\Rpp\Init.Rpp
// Produces a calendar for any year from 1582. Week numbers by
// ISO 8601 effective 1972. Default CalendarYear() is present year.
Proc Init lan(e) Endproc
// Proc Calend Pdffil(C:\Rapp\Pdf\a1.Pdf) CalendarYear(1889) charsperday(1) visa ENDPROC
Proc Calend Pdffil(C:\Rapp\Pdf\a2.Pdf) prompt visa charsperday(1) ENDPROC
```

All buttons and boxes are explained at right-click. The red button M displays the Rapp manual in pdf. The red button P next to it displays the text in edit in pdf. One can think of P as meaning Print, since the pdf file will give a good printout on paper with Ctrl+P.