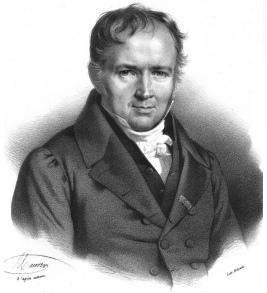
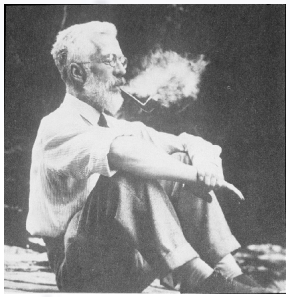
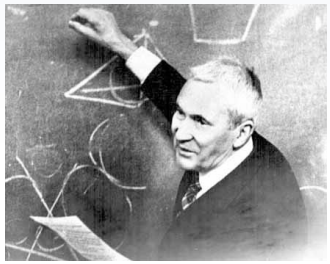
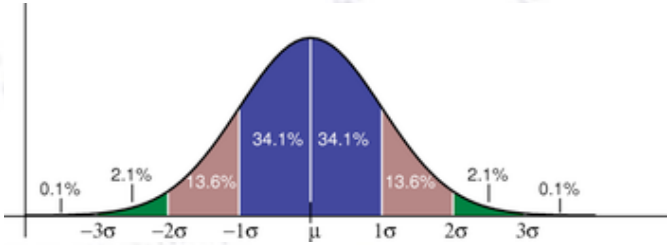
Applied Statistics

Exam information

Troels C. Petersen (NBI)



"Statistics is merely a quantisation of common sense!"

Exam check list

The following is a list of things I suggest that you check regarding your solution:

- **Quantify!** When possible, put numbers, errors, z-values, p-values, etc.
- Check that you have (tried to) answer all questions.
- Ensure that your errors are correct/"reasonable", e.g. divided by sqrt(N).
- Check that you have calculated Chi2 and p-value with comments, when possible.
- Make sure that you have described what you assume, use, and do.
  - Do you assume non-correlation? Equal errors? Gaussian errors?
  - Do you use error propagation formula, Central Limit Theorem?
  - What did you do? Show calculations, intermediate results, etc.
- Check that your PDF is (easily) readable to those correcting it.
- When fitting, write the fit parameters, and comment on them.
- Remember, that you can not prove a hypothesis… only reject it!
- When you don't have a solution, describe instead how you would get one.

Possible advice regarding work:

- Start out by reading the whole exam through in detail.
- Work out a quick-and-dirty solution, before longer solutions.
- Re-read the whole exam again Friday morning.

Based on our experience…

Put Chi2, Ndof and p-value in figures AND in the text with COMMENTS.

Write down functions you use/fit with, and put number of Degrees-of-Freedom.

Write down what type of fit you do: Chi2 or LLH (binned or unbinned).

Mention formulae used, and show larger calculations specifically (2nd eq. best):

$$P = \sum r^n (1-r)^{N-n} \qquad P = \sum_{i=1}^{4} P_{binomial}(r, N = 4, p_{succes} = 1/6)$$

State if p-values are significantly, i.e. choose a significance level, and compare.

Get significant digits right! Possibly show many digits and then shorten correctly.

When generating random numbers according to function, plot function on top.

Write down assumptions, which PDF you have used, and QUANTIFY.

Formats of exam solutions

Just to make it clear:

All should be submitted on eksamen.ku.dk

Your solutions has to be submitted in PDF format!

Your code should be submitted as appendix (any format).

Formats of exam solutions

Just to make it clear:

All should be submitted on eksamen.ku.dk

Your solutions has to be submitted in PDF format!

Your code should be submitted as appendix (any format).

You are welcome to submit PDFs extracted from your Jupyter Notebooks, but

…it should be readable.

In order to do so, StackOverflow is a great source:
https://stackoverflow.com/questions/34818723/export-notebook-to-pdf-without-code

1) hav hidecode.tplx i samme mappe som filerne du vil konvertere. hidecode.tplx skal indeholde koden:

```
    ((*- extends 'article.tplx' -*))

((* block input_group *))
    ((*- if cell.metadata.get('nbconvert', {}).get('show_code', False) -*))
        ((( super() )))
    ((*- endif -*))
((* endblock input_group *))
```

2) OBS: Hvis du har brugt ERDA Jupyter's File -> Export Notebook as -> PDF, har du en notebook.tex fil i mappen. Slet den, ellers vil koden ikke blive skjult i PDF'en med denne metode.

3) Åbn en terminal I ERDA Jupytervia File -> New -> Terminal

4) Skriv i terminalen:

jupyter nbconvert --to pdf --template hidecode Example.ipynb

Hvor Example er navnet på din notebook-fil

5) Åbn din PDF, og tjek at koden er gemt. Hvis ikke, slet notebook.tex i mappen og kør igen.

Formats of exam solutions

Just to make it clear:

All should be submitted on eksamen.ku.dk

Your solutions has to be submitted in PDF format!

Your code should be submitted as appendix (any format).

It is YOUR responsibility, that your solution is readable!

```
    ((*- extends 'article.tplx' -*))

((* block input_group *))
    ((*- if cell.metadata.get('nbconvert', {}).get('show_code', False) -*))
        ((( super() )))
    ((*- endif -*))
((* endblock input_group *))
```

2) OBS: Hvis du har brugt ERDA Jupyter's File -> Export Notebook as -> PDF, har du en notebook.tex fil i mappen. Slet den, ellers vil koden ikke blive skjult i PDF'en med denne metode.

3) Åbn en terminal I ERDA Jupytervia File -> New -> Terminal

4) Skriv i terminalen:

jupyter nbconvert --to pdf --template hidecode Example.ipynb

Hvor Example er navnet på din notebook-fil

5) Åbn din PDF, og tjek at koden er gemt. Hvis ikke, slet notebook.tex i mappen og kør igen.

Outlining solutions

If you think that you understand the problem, but for some reason…

- Multiple inconsistent approaches
- Numerical problems
- Plotting problems
- Other code problems
- Time problems
- Extend this list yourself

…can't get a viable solution out and down on paper, then **don't give up!**

Calmly, write down in detail what you **would have done**, given non of the above problems. This does not give you full point, but if you convince the censor (and us), that you **understand** the problem and could solve it, given more time, then we will give you significant partial points.

Comment on code sharing!

Out of interest, we run Moss (Measure Of Software Similarity) on your code, which is an automatic system for determining the similarity of programs (e.g. detecting plagiarism in programs).

Moss Results

[redacted]

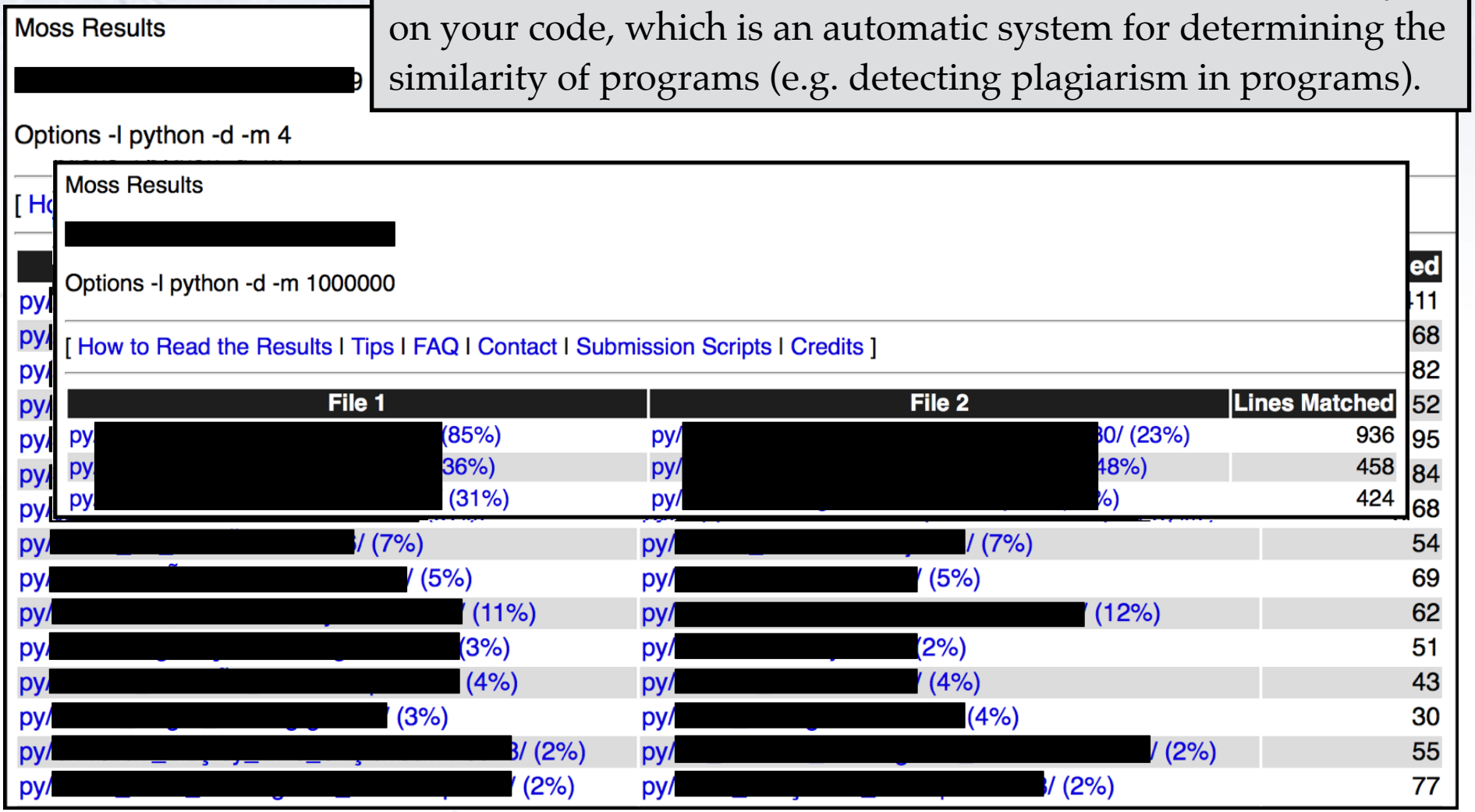
Options -l python -d -m 4

[How to Read the Results | Tips | FAQ | Contact | Submission Scripts | Credits]

File 1	File 2	Lines Matched
py[redacted] (32%)	py[redacted] (43%)	411
py[redacted] (7%)	py[redacted] (6%)	68
py[redacted] (8%)	py[redacted] (6%)	82
py[redacted] (7%)	py[redacted] (13%)	52
py[redacted] (4%)	py[redacted] (4%)	95
py[redacted] (20%)	py[redacted] (14%)	84
py[redacted] (3%)	py[redacted] (0%)	68
py[redacted] (7%)	py[redacted] (7%)	54
py[redacted] (5%)	py[redacted] (5%)	69
py[redacted] (11%)	py[redacted] (12%)	62
py[redacted] (3%)	py[redacted] (2%)	51
py[redacted] (4%)	py[redacted] (4%)	43
py[redacted] (3%)	py[redacted] (4%)	30
py[redacted] (2%)	py[redacted] (2%)	55
py[redacted] (2%)	py[redacted] (2%)	77

Comment on code sharing!

Out of interest, we run Moss (Measure Of Software Similarity) on your code, which is an automatic system for determining the similarity of programs (e.g. detecting plagiarism in programs).



Don’t stay up all night…

“Doing statistic problems during the entire night is like partying. You can't stop yourself, but the next day you feel miserably…”

[End of a 2019 exam solution]

Thank you for all your dedication & hard work.

It has been a pleasure…