Portfolio Exam MAE40000, Autumn 2026

The examportfolio for MAE4000 Data Science consists of 3 components:

1. Data wrangling & auditing component
2. Visualization component
3. Report & Inference component

Each component counts for one-third of the final grade and you need to pass each component to pass the exam. Grades are awarded on a scale from A to F, where A is the best grade and F is a fail. You have to pass all three components in the same semester for the exam result to be valid.

To submit the exam portfolio, you will need to upload your portfolio as 5 separate files,

with specific filenames and in the following order:

1. **DATA-YOUREXAMNUMBER.RDS**
2. **COMPI-YOUREXAMNUMBER.R**
3. **Visualization-YOUREXAMNUMBER.pdf**
4. **Visualization-YOUREXAMNUMBER.R**
5. **COMPIII-YOUREXAMNUMBER.pdf**

Obviously change the YOUREXAMNUMBER placeholder in the filenames to the actual exam number that got assigned to you for this course.

Detailed instructions are available on CANVAS but are also repeated in the pages that follow in this document.

Thoroughly read the instructions and double check before delivering!

[Portfolio] Component I: Data wrangling & Auditing

Note down your exam number (you receive it ca. 2 weeks in advance) and fill it in to get your own custom datasets for the portfolio component here: https://cemo.shinyapps.io/datagenerator

This will allow you to download two individualized datasets to wrangle & clean.

1. *ITEMS-YOURID.csv* dataset containing 3 variables representing responses on 30 survey items by parents of 5-6 year old kids
    - Person unique person identifier
    - Item number corresponding to order of the item in the survey: 1 to 30
    - Y survey response with 1 = agree, 2 = undecided, 3 = disagree
2. *STUDENTS-YOURID.txt* dataset containing 4 variables with additional information on the persons taking the survey
    - P unique person identifier equivalent to Person in the former dataset
    - G gender of the child, with 1 = female, 2 = male
    - S self-reported perceived travel time (SRTT) of the family to school, with 4 ordered categories: 1 = very short, 2 = short, 3 = long, 4= very long

    A age of the child in years **The desired dataset:**

- A single dataset in wide format with Person as the research unit
- Variable order: Person Gender SRTT Age Item01-Item30 Undecided1 Undecided2 Use
- Rows sorted on decreasing Person identifier number
- The survey responses on the uneven items have been reverse-coded.
- The two new variables Undecided1 and Undecided2 show the number of undecided responses given by the person on the first and second half of the survey, respectively;
- The new variable Use records whether or not (TRUE/FALSE) the person has used each of the three response categories (1-2-3) across all survey items;
- ***TO ACE this component:*** Provide a final extra variable Match which contains for each person, the Person ID of one other person that has a response pattern across all other variables listed above (from Gender to Use) that most closely matches with the given person [count a variable with a dissimilar value as one mismatch].

Deliverables:

- a single clean RDS datafile **DATA-YOUREXAMNUMBER.RDS**
    - Your dataset's dimensions would be approximately (depending on data auditing decisions) *n* research units x (4+30+3+1) variables.

- the corresponding annotated Rscript **COMPI-YOUREXAMNUMBER.R** to generate this datafile
    - remember to include explicit statements to import the two starting data files and export the final dataset to RDS. ○ remember to reason for data management and/or auditing decisions in the syntax comments
    - you cannot use functions from packages that are not included in base R (i.e., anything that required an install.packages call)! ○ check whether your code is reproducible! (see canvas)

[Portfolio] Component II: Data Visualization

The data visualization component consists of two parts, a critical evaluation of a data graphic and your own design data graphic. **Deliverables**

- 1 PDF file **Visualization-YOUREXAMNUMBER.pdf** containing 4 pages (see below) and layout in APA style (i.e., font size 12, Times New Roman, 1 inch margins, Double-spaced lines). ○ Any page outside the stated page limits and requirements will not be read.
- 1 R file **Visualization-YOUREXAMNUMBER.R** (see below) for part 2

Five Criteria

1- Gestalt principles & visual structure
2- Keep it simple: Decoding & Operations
3- Less is more: Chartjunk & data-ink ratio
4- Graphical data integrity & lie factor
5- Annotation & stand-alone readability

Part 1. Graphic inquisition

- Include the target figure of your critique on a separate page in APA style and with mentioning of its source. ○ Make sure you choose a figure that has sufficient meat to it, that there is something to critique. *It needs to be a data graphic, not an infographic.* When in doubt, verify with me!
    - It cannot be a figure that we discussed already in class.
- Discuss on maximum one page the figure's flaws (and potential merits) according to the 5 criteria of good graphical design for data representation and using relevant terminology.
    - explicitly structure your page per criterium: <criterium X>: two arguments (repeat for the other 4 criteria).

        - NOTE: The same design feature can often affect multiple criteria, but you can only bring in the design feature under one criterium.
    - You have only one page so do not focus on non-crucial details, but clearly show that you understand priorities.
- *Grading: Equal weight across criteria yet auto-zero when Figure does not comply with requirements.*

Part 2. Graphic design

- Include your own designed figure on a separate page in APA-style
- **Figure requirements** ○ represents at the minimum 3 variables
    - consists of a minimum of two panels (either by means of facets or using the layout grid system)
        - *caveat: Having a figure with three or more panels, where only a single variable is shown per panel = auto zero on this part of the component.*
    - You can use one of the pre-assigned datasets in class or use one of your own choice, but it should be freely accessible to us within R.
    - The corresponding R-code used to construct the figure needs to be ggplot-based, annotated, and stand-alone reproducible.
- Summarize on maximum 1-page (i) what the figure intends to show/clarify and (ii) for each <criterium X>, a justification for a design choice you made. Explicitly structure your response following these requirements.
- *Grading: Rated according to the same 5 criteria, with equal weight across criteria, and taking into account your own argumentation for the chosen design. Yet, auto-zero when the Figure does not comply with requirements OR when it is a not-customized copy of an R-example found on the web.*

[Portfolio] Component III: Statistical Inference

Beall, A. T., & Tracy, J. L. (2013). Women Are More Likely to Wear Red or Pink at Peak Fertility. *Psychological Science, 24(9)*, 1837-1841. https://doiorg.ezproxy.uio.no/10.1177/0956797613476045

Explicitly structure your report paper according to the following three sections:

1. What do they claim?
2. What did they actually do? (This includes study design and obtained results.)

3. What can you conclude based upon what they did? Divide this section explicitly in 5 subsections that align with **Abelson's MAGIC criteria.**

The first two sections should remain factual but complete; reserve your critique solely for the third section!

- 5 terms that need to be included in your paper: *sample, effect size, replication, comparison, and measurement* **Deliverables**
- one report **COMPIII-YOUREXAMNUMBER.pdf** in APA style (1inch margins, double-spaced, 12pt font size), max. 6 pages ○ Any page outside the stated page limits & requirements will not be read. ○ A report paper that does not adher to the requested structure receives auto-zero.

Grading guide

INSTRUCTIONS
Go to https://cemo.shinyapps.io/datagenerator/
fill in exam number of the student for data file import
download the two files & put them in Component I folder
shorten source path in import to filename -> run syntax

Component I

	EXAM NR # 1	
DATA-IM/EXPORT (score binary 1/0)	**3**	**0**
*proper import STUDENTS-YOURID.txt	1	
*proper import ITEMS-YOURID.csv	1	
*proper export to DATA-YOURID.RDS of final dataset *needs to be exact*	1	
DATA AUDITING	**7**	**0**
*Intentional search for anomalies (systematic search and reporting even on parts where no problems occurred)	2	
*Finding & Handling anomalies with justification! *(4 anomalies = ,75 point per: impossible item response value of 0, impossible age value of 0, duplicates in STUDENTS dataset, duplicates in ITEMS dataset) & ,5 points each for justification*	5	
DATA STRUCTURING	**5**	**0**
*Wide format with Person as research unit	1	
*succesful merger STUDENTS & ITEMS	1	
*unique Person id	1	
*rows sorted on decreasing Person (number)	1	
*exact variable names & order as specified [Person Gender SRTT Age Item01-Item30 Undecided1 Undecided2 Use Match]	1	

DATA COMPUTATION	11	0
* uneven items reverse coded	1	
* **Undecided1/2:** number of undecided responses on first/second half of items	2	
* **Use:** binary TRUE/FALSE used all 3 response categories across all survey items	2	
* **Match:** Person id of other person with response pattern from gender to use most closely matches the given person; count: a dissimilar value = 1 mismatch	4	
* Up to date computation AFTER rescoring/anomaly handling (0,5 point per newly computed variable)	2	
CODE SYNTAX STRUCTURE	**3**	**0**
* code runs from start to end	2	
* readability: structure & comments	1	
TOTAL	**29**	**0**
Grade	**A**	**F**
COMMENT		

They cannot use functions from packages that are not included in base R.

Grade Transformation	Score
F	16
E	18
D	20
C	22
B	24
A	27

Component II

	EXAM NR #	1
Graphic Inquisition subscore	**11**	**0**
APA style (Including source of figure)	1	
1- Gestalt principles & visual structure	2	
2- Keep it simple: Decoding & Operations	2	
3- Less is more: Chartjunk & data-ink ratio	2	
4- Graphical data integrity & lie factor	2	
5- Annotation & stand-alone readability	2	
2 arguments per criterion, use of relevant terminology, no repetition of same design feature under more than one criterium, priority issues addressed, 1 page total		

Figure should be a data graphic not an infographic (and also not a figure discussed in class); if they ignored this basic requirement, fill in a 0, or a 1 otherwise.	***1***

Graphic Design subscore	**11**	**0**
1- Gestalt principles & visual structure	2	
2- Keep it simple: Decoding & Operations	2	
3- Less is more: Chartjunk & data-ink ratio	2	
4- Graphical data integrity & lie factor	2	
5- Annotation & stand-alone readability	2	
APA compliance (Bold Figure next line italic title; actual figure, & below an optional note)	1	
Reproducible R script	**1**	
Min Req> 3 variables+2 panels/facets+not mere 4 data points	1	
NOT Potential plagiarism/mere internet copypaste: fill in a 1, or a 0 otherwise.	***1***	

Total	**22**	**0**
Grade	**A**	**F**
COMMENT		

Grade Transformation	Score
F	**10**
E	**11**
D	**13**
C	**15**
B	**17**
A	**20**

Component III

	EXAM NR #	1
What do they claim? (factual complete intro/abstract/discussion no critique yet)	**6**	**0**
red = attractive; universality = suggested	1	
red and pink adornment in women is reliably associated with fertility and that female ovulation, long assumed to be hidden, is associated with a salient visual cue	3	
high conception risk vs low conception risk 3 more likely to wear pink/red	1	
77% of women wearing red/pink were at high rather than low risk	1	
What did they actually do? (factual complete study design+results no critique yet)	**8**	**0**

Sample: 2 samples: A) n= 100 American women [Age 18-47;M=26] via Amazon Turk and for monetary compensation; B) n = 24 female undergraduates at University of Britisgh Columbia [Age: 17-31; M=19] for course credit 2

Sample: excluded 40+, birth control users, smokers, pregnant, atypical cycle, etc. / excluded according to confidence in estimate 1

Measures: all measures online survey self report; Color of shirt being worn, latter used to classifiy in pink/red or otherwise + days since last menses, latter used for high/low risk group classification + confidence in self-report estimate 3

Analysis: wear red/pink for high vs low risk: Sample A: 26% vs. 8%, $\chi 2(1, N = 100) = 5.32$, $p = .02$, odds ratio = 3.85; Sample B: 40% vs. 7%, $\chi 2(1, N = 24) = 3.82$, $p = .051$, odds ratio = 8.67. 1

Analysis: of those wearing red/pink (n=A:17/B:5), 76% of women in Sample A and 80% of women in Sample B were at high risk; for other color (n=A:83/B:19), 46/32 % were at high risk. 1

What can you conclude based upon what they did? Critiques in subsections according to Abelson's MAGIC criteria	**9**	**0**

Magnitude (size of "effect" in light of size of "cause", effect size) 2

e.g., large effect size but relatvely small sample especially for part results and groups (red=17 & 5!), and 1st main result did not replicate across samples (p=.051);women at high risk were not all wearing red/pink…(they mostly selectively focus report on the redwearing women)

Articulation (specific and precise formulation) 2

e.g., not very specific or precise in how causal mechanism works: vague evolutionary explanation + high researchers degrees of freedom especially wrt exclusion and classification in groups

Generality (breadth in support and in applicability) 2

e.g., selection bias sample: online survey and localized in North America

Interestingness (change, impact, surprise, value) 1

e.g., visual cue sounds interesting, but not very practical useful

Credibility (believable, theoretically coherent, sound methods) 2

e.g., self-report measures weaken study design; multiple comparison problem: pink+red vs other; tons of other comparisons possible that might also be significant/cherrypicking...+between not within-subject design +no confounders (weather culture trends)/alternative explanations considered+followup studies don't replicate

Words (included in text + proper use)	2	0
sample	1	
effect size	1	
replication	1	
comparison	1	
measurement	1	
INLINE WITH REQUIREMENTS: apa 12pt font double-spaced 1inch margins + explicit sectioning as in guide	1	
Total	**25**	**0**

Grade **A** **F**

Comment

max6 pages anything beyond is not read

Grade Transformation	Score
F	13
E	14
D	16
C	18
B	20
A	23

Overview

Final grade auto-computed based on the three other sheets

	EXAM NR
	# 1
I	0
	F
	1
II	0
	F
	1
III	0
	F
	1
GRADE	F
AVE	0
ROUND(AVE)	0
Sumscore	0

Rounded average of all three components is the final grade, with the exception that failure of one component results in an overall failure