

This is a Very Important Title!

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This abstract is abstract.

If you want to learn more about using L^AT_EX, you should check UiO's official tutorials: <https://www.mn.uio.no/ifi/tjenester/it/hjelp/latex/>

If you are familiar with L^AT_EX and you want to learn more about the REVTeX4-1 document class, check: http://www.physics.csbsju.edu/370/papers/Journal_Style_Manuals/auguide4-1.pdf

PROBLEM 1

Vi har

$$\gamma \frac{d^2 u(x)}{(dx)^2} = -Fu(x)$$

og skal vise at ved skalering blir dette

$$\frac{d^2 u(\hat{x})}{(d\hat{x})^2} = -\lambda u(\hat{x})$$

hvor $\hat{x} = \frac{1}{L}$ og $\lambda = \frac{FL^2}{\gamma}$.

Vi starter med å se at

$$\frac{1}{dx} = \frac{d\hat{x}}{dx} \frac{d}{d\hat{x}} = \frac{d(\frac{x}{L})}{dx} \frac{d}{d\hat{x}} = \frac{1}{L} \frac{d}{d\hat{x}}$$

Så da får vi at

$$\frac{d^2 u(x)}{dx^2} = \frac{1}{L^2} \frac{d^2 u(\hat{x})}{d\hat{x}^2}$$

som gir oss

$$\frac{\gamma}{L^2} \frac{d^2 u(\hat{x})}{d\hat{x}^2} = -Fu(\hat{x})$$

så flytter vi over og får

$$\frac{d^2 u(\hat{x})}{d\hat{x}^2} = -\frac{L^2 F}{\gamma} u(\hat{x})$$

så setter vi inn λ og får:

$$\frac{d^2 u(\hat{x})}{d\hat{x}^2} = -\lambda u(\hat{x})$$

som vi skulle vise. \square

I. PROBLEM 2

Vi vet at $UU^T = UU^{-1} = I$ og at $v_j v_i = \delta_{ji}$. Vi skal så vise at for

$$w_j^T w_i = \delta_{ji}$$

for å vise at U tar var på ortonormaliteten til v_i under multiplikasjon.

Vi starter først med

$$w_j = Uv_j$$

og transponerer denne:

$$w_j^T = (Uv_j)^T = v_j^T U^T = v_j^T U^{-1}$$

så tar vi

$$w_j^T w_i = v_j^T U^{-1} U v_i = v_j^T I v_i = v_j^T v_i = \delta_{ji}$$

som vi skulle vise. \square

PROBLEM 3

Koden kan finnes i som prob3.cpp.

Vi konstruerer de analytiske egenverdiene som

$$\lambda_i = d + 2 * a \cos\left(\frac{i\pi}{N+1}\right)$$

og egenvektorene i en matrise som

$$v_i = \left[\sin\left(\frac{i\pi}{N+1}\right), \sin\left(\frac{2i\pi}{N+1}\right), (\dots), \right.$$

$$\left. \sin\left(\frac{ji\pi}{N+1}\right), (\dots) \sin\left(\frac{Ni\pi}{N+1}\right) \right]^T$$

og konstruerer A som den tridiagonale matrisen og bruker `arma::vec` til for å finne egenverdiene for å sammenligne med de analytiske verdiene. `arma::vec` normaliserer egenvektorene også så vi må også normalisere de analytiske egenvektorene og sammenlikner vi nå ser vi at de armadillos egenvektorer og de analytiske egenvektorene stemmer.

II. METODE

III. RESULTATER

IV. DISKUSJON

V. KONKLUSJON

ACKNOWLEDGMENTS

I would like thank myself for writing this beautiful document.

REFERENCES

- Reference 1
- Reference 2

Appendix A: Name of appendix

This will be the body of the appendix.

Appendix B: This is another appendix

Tada.

Note that this document is written in the two-column format. If you want to display a large equation, a large

figure, or whatever, in one-column format, you can do this like so:

This text and this equation are both in one-column format.

[?]

$$\frac{-\hbar^2}{2m}\nabla^2\Psi + V\Psi = i\hbar\frac{\partial}{\partial t}\Psi \quad (\text{B1})$$

Note that the equation numbering (this: B1) follows the appendix as this text is technically inside Appendix B. If you want a detailed listing of (almost) every available math command, check: <https://en.wikibooks.org/wiki/LaTeX/Mathematics>.

And now we're back to two-column format. It's really easy to switch between the two. It's recommended to keep the two-column format, because it is easier to read, it's not very cluttered, etc. Pro Tip: You should also get used to working with REVTeX because it is really helpful in FYS2150.

One last thing, this is a code listing:

```
This will be displayed with a cool programming font!
```

You can add extra arguments using optional parameters:

```
This will be displayed with a cool programming font!
```

You can also list code from a file using `\lstinputlisting`. If you're interested, check https://en.wikibooks.org/wiki/LaTeX/Source_Code_Listings.

This is a basic table:

Table I. This is a nice table

| | | |
|-------|-------|-------|
| Hey | Hey | Hey |
| Hello | Hello | Hello |
| Bye | Bye | Bye |

You can a detailed description of tables here: <https://en.wikibooks.org/wiki/LaTeX/Tables>.

I'm not going to delve into Tikz in any level detail, but here's a quick picture:

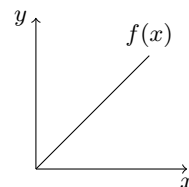


Figure 1. This is great caption

If you want to know more, check: <https://en.wikibooks.org/wiki/LaTeX/PGF/TikZ>.