

The Power of \LaTeX : From Research Papers to Résumés

July 25, 2022

Homework Number 10. Due Thursday, 14 April 2022.

In this course, unless stated otherwise, when a problem consists of a statement, then you are suppose to provide a proof or counterexample.

Problem 1. Let U be an open subset in \mathbb{R}^2 containing the rectangle $R = [a, b] \times [c, d]$ and let $f: U \rightarrow \mathbb{R}$ be a smooth function. Use the Fubini Theorem and the Fundamental Theorem of Calculus to find the integrals

$$\int_{(x,y) \in R} \frac{\partial^2 f}{\partial x \partial y}(x, y) \quad \text{and} \quad \int_{(x,y) \in R} \frac{\partial^2 f}{\partial y \partial x}(x, y)$$

Problem 2. If $A, B \in \mathbb{M}_n$ and A and B are similar, then $N(A) = N(B)$.

Problem 3. Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be the linear transformation given by reflecting across the plane $x_1 - 2x_2 + 2x_3 = 0$. Use the change-of-basis formula to find its standard matrix.

Problem 4. Suppose $\mathcal{B} = \{v_1, \dots, v_n\}$ is a basis for a vector space V and

$$\begin{array}{ccc} V & \xrightarrow{T} & W \\ A \downarrow & & \downarrow B \\ X & \xrightarrow{S} & Y \end{array}$$

is a diagram of vector spaces and linear transformations. If for every $j = 1, \dots, n$, $BT(v_j) = SA(v_j)$, then the diagram commutes; that is, for every vector $x \in V$, $BT(x) = SA(x)$.

Problem 5. Let A be a 3×3 matrix with the following properties. A has exactly two eigenvalues: 1 and -2 . Moreover, $\dim E(1) = 1$ and $\dim E(-2) = 2$. Is A diagonalizable? Why or why not? If it is, give a diagonal matrix D such that A is similar to D .

Problem 6. Find the eigenvalues and eigenvectors of the linear transformation

$$T(x, y) = \begin{bmatrix} 2x + 2y \\ 5y - x \end{bmatrix}.$$

What is L^AT_EX?

- ▶ A way of making documents with formatting, but in “code” instead of with an editor like Word or Google Docs
- ▶ Code is mixed in with plaintext to define formatting for that text
- ▶ Can be used to make all sorts of things!
 - ▶ Documents with lots of formatting, like résumés or posters
 - ▶ Papers with lots of symbols, like equations and proofs
 - ▶ Presentations (like this one!)
- ▶ There are tools to write it online, just like a Google Doc!

Let's try it out!

Go to overleaf.com to start editing.

Adding Tables, Lists, Images etc.

\LaTeX supports all the formatting that you would expect from Word or Google Docs. To demonstrate this, let us work through a simple example of writing a recipe book!

We will learn how to make Fried ~~Chicken~~ Squirrel.

L^AT_EX environments

- ▶ Environments define special formatting within a block
- ▶ `\begin{environment}` and `\end{environment}`, and then text inside is formatted in a specific way
 - ▶ The `itemize` environment styles `\item` to make it look like a list item
 - ▶ The `align` environment allows equations to be aligned
 - ▶ The `tabular` environment styles its content as a table (and takes extra parameters for table styling)

Equations

Let's say a professor gives you this equation, and you want to type it into your notes or a homework assignment:

$$\nabla J_{\theta_j}(\theta) = \frac{1}{m} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)}) x_j^{(i)}$$

How would you write this in Google Docs or Microsoft Word?

Example: Calculus

Let's start with a basic calculus problem.

$$\int_0^1 x^2 dx$$

Example: Proof

How would we write a proof—for example, a proof that the sum of two even numbers is even?

Example: Normal Distribution

How would we write this equation?

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

How would you write this in Google Docs or Microsoft Word?

So, when should I use L^AT_EX?

~~at night~~

So, when should I use \LaTeX ?

- ▶ There are tons of classes where \LaTeX can come in handy!
 - ▶ Discrete Structures & Algorithms
 - ▶ Math (especially more proof and symbol-heavy courses)
 - ▶ Machine Learning
 - ▶ Labs in the sciences with equations
- ▶ Résumés – allows you to add information easily, without lots of reformatting work
- ▶ Research papers

Résumés

[illegible]

Anti CV

Most overleaf users have a curriculum vitae or a re...

Stephen Fay

Thierry Gold

22 years old

Employee

email@company.com

1234567890

1234

1234

Customer

name@company.com

1234567890

1234

1234

1. Name

Thierry Gold

Thierry Gold

2. Address

1234567890

1234567890

1234567890

3. Phone

1234567890

1234567890

1234567890

4. Email

1234567890

1234567890

1234567890

5. Password

1234567890

1234567890

1234567890

6. Profile

1234567890

1234567890

1234567890

7. Settings

1234567890

1234567890

1234567890

8. Account

1234567890

1234567890

1234567890

9. Security

1234567890

1234567890

1234567890

10. Support

1234567890

1234567890

1234567890

11. Feedback

1234567890

1234567890

1234567890

12. About

1234567890

1234567890

1234567890

13. Contact

1234567890

1234567890

1234567890

14. Help

1234567890

1234567890

1234567890

15. Privacy

1234567890

1234567890

1234567890

16. Terms

1234567890

1234567890

1234567890

17. License

1234567890

1234567890

1234567890

18. About

1234567890

1234567890

1234567890

19. Contact

1234567890

1234567890

1234567890

20. Help

1234567890

1234567890

1234567890

21. Privacy

1234567890

1234567890

1234567890

22. Terms

1234567890

1234567890

1234567890

23. License

1234567890

1234567890

1234567890

24. About

1234567890

1234567890

1234567890

25. Contact

1234567890

1234567890

1234567890

26. Help

1234567890

1234567890

1234567890

27. Privacy

1234567890

1234567890

1234567890

28. Terms

1234567890

1234567890

1234567890

29. License

1234567890

1234567890

1234567890

30. About

1234567890

1234567890

1234567890

31. Contact

1234567890

1234567890

1234567890

32. Help

1234567890

1234567890

1234567890

33. Privacy

1234567890

1234567890

1234567890

34. Terms

1234567890

1234567890

1234567890

35. License

1234567890

1234567890

1234567890

36. About

1234567890

1234567890

1234567890

37. Contact

1234567890

1234567890

1234567890

38. Help

1234567890

1234567890

1234567890

39. Privacy

1234567890

1234567890

1234567890

40. Terms

1234567890

1234567890

1234567890

41. License

1234567890

1234567890

1234567890

42. About

1234567890

1234567890

1234567890

43. Contact

1234567890

1234567890

1234567890

44. Help

1234567890

1234567890

1234567890

45. Privacy

1234567890

1234567890

1234567890

46. Terms

1234567890

1234567890

1234567890

47. License

1234567890

1234567890

1234567890

48. About

1234567890

1234567890

1234567890

49. Contact

1234567890

1234567890

1234567890

50. Help

1234567890

1234567890

1234567890

51. Privacy

1234567890

1234567890

1234567890

52. Terms

1234567890

1234567890

1234567890

53. License

1234567890

1234567890

1234567890

54. About

1234567890

1234567890

1234567890

55. Contact

1234567890

1234567890

1234567890

56. Help

1234567890

1234567890

1234567890

57. Privacy

1234567890

1234567890

1234567

Spider CV

LaTeX class template for CV/resume. Called Spider ...

RomainPC

[illegible]

my-resume

My take on a resume. Inspired by various other proj...

Nico Krieger

[illegible]

resume template (CJK support)

A simple resume/CV template with CJK (Chinese J...

gobborz, timmy chan



JOHN DOE

[View Bio](#)
[View Portfolio](#)
[View Projects](#)

STRENGTHS

- Teamwork
- Communication
- Problem Solving
- Time Management
- Adaptability
- Leadership
- Attention to Detail
- Collaboration
- Initiative
- Resilience
- Empathy
- Flexibility
- Accountability
- Open-mindedness
- Resourcefulness
- Patience
- Humility
- Perseverance
- Integrity
- Proactivity
- Emotional Stability
- Self-motivation
- Empathy
- Resilience
- Adaptability
- Teamwork
- Communication
- Problem Solving
- Time Management
- Adaptability
- Leadership
- Attention to Detail
- Collaboration
- Initiative
- Resilience
- Empathy
- Flexibility
- Accountability
- Open-mindedness
- Resourcefulness
- Patience
- Humility
- Perseverance
- Integrity
- Proactivity
- Emotional Stability
- Self-motivation

ABOUT ME

I am a passionate and motivated professional with over 10 years of experience in the field of software development. I have a strong background in both front-end and back-end technologies, and I am always looking for new challenges and opportunities to grow my skills.

EXPERIENCE

Company A

- Software Engineer
- Front-end Development
- React.js
- JavaScript
- HTML/CSS

[View Projects](#)

Company B

- Software Engineer
- Front-end Development
- React.js
- JavaScript
- HTML/CSS

[View Projects](#)

LEARNING

Company C

- Software Engineer
- Front-end Development
- React.js
- JavaScript
- HTML/CSS

[View Projects](#)

Company D

- Software Engineer
- Front-end Development
- React.js
- JavaScript
- HTML/CSS

[View Projects](#)

LANGUAGES

I am fluent in the following languages:

- English (Native)
- Spanish (Intermediate)
- French (Basic)

REFERENCES

I have worked with several clients and colleagues who can provide references for my work.

Ref 1: [John Doe](#)
 Ref 2: [John Doe](#)
 Ref 3: [John Doe](#)
 Ref 4: [John Doe](#)

PROJECTS

Project 1

- Front-end Development
- React.js
- JavaScript
- HTML/CSS

[View Projects](#)

Project 2

- Front-end Development
- React.js
- JavaScript
- HTML/CSS

[View Projects](#)

AltaCV | NicolasOmar Fork

A forked version of AltaCV template with Light/Da...

Nicolás Omar González Passerino

Other Cool Things in \LaTeX

- ▶ Macros – custom commands with user-defined parameters that can expand into bigger commands
- ▶ Community packages, like `halloweenmath`! 🎃 🧛 🐻

And when shouldn't I use \LaTeX ?

\LaTeX is not the best tool for everything. For example, we didn't need \LaTeX to make this presentation... and yet we did.

In general, if you think \LaTeX is overkill for a project, it probably is.

But the payoff is that you only need to focus on the content of your document—not endless typesetting details.

Thank you!