

LATEX TEMPLATE FOR GITHUB

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ABSTRACT. Your abstract here.

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1. INTRODUCTION

Your introduction here. Include some references [1, 2, 3]. Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also

Date: January 6, 2026.

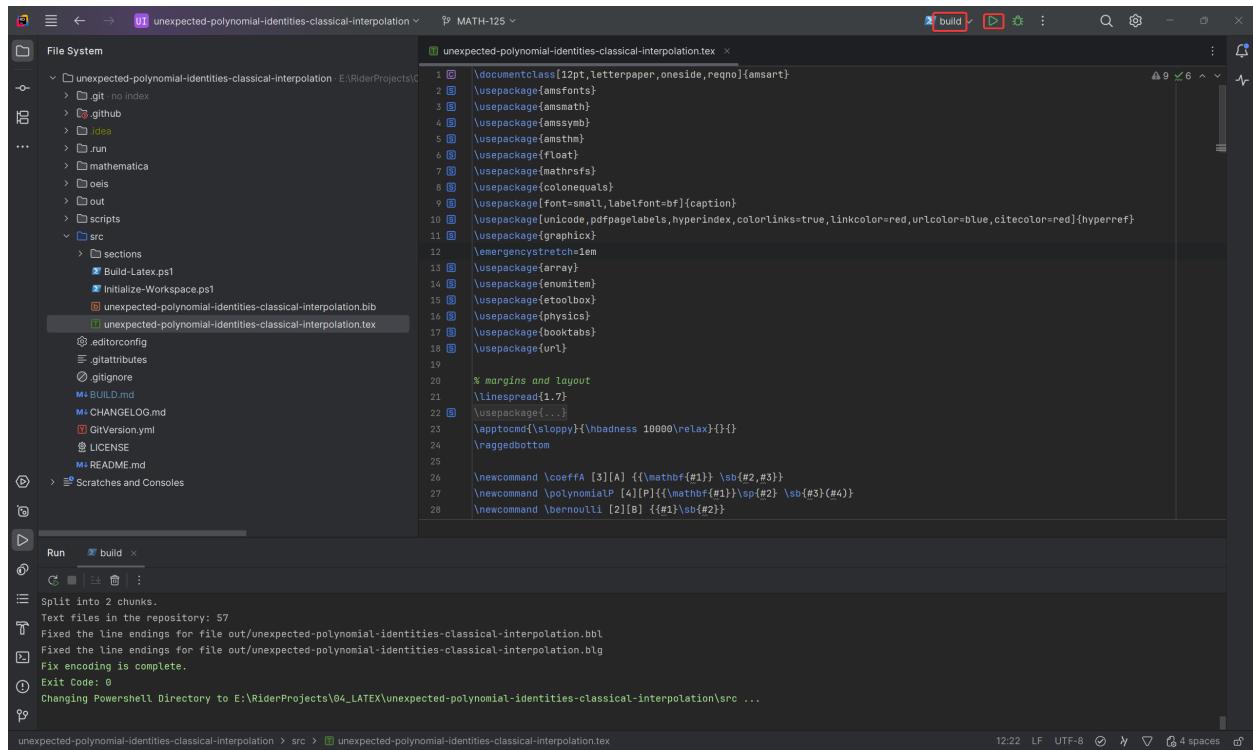
2010 Mathematics Subject Classification. 05A19, 05A10, 41A15, 11B68, 11B73, 11B83.

Key words and phrases. Sums of powers, Newton's interpolation formula, Finite differences, Binomial coefficients, Faulhaber's formula, Bernoulli numbers, Bernoulli polynomials Interpolation, Approximation, Discrete convolution, Combinatorics, Polynomial identities, Central factorial numbers, Stirling numbers, Eulerian numbers, Worpitzky identity, Pascal's triangle, OEIS.

DOI: <https://doi.org/10.5281/zenodo.18040979>

the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Image example



The screenshot shows the Rider IDE interface with a LaTeX project open. The left sidebar displays the file system structure of the project, which includes files like `Build-Latex.ps1`, `Initialize-Workspace.ps1`, and the main `unexpected-polynomial-identities-classical-interpolation.tex` file. The right pane shows the code editor with the `unexpected-polynomial-identities-classical-interpolation.tex` file open. The code is a LaTeX document with various packages and definitions. The status bar at the bottom indicates the file is saved with LF encoding and UTF-8 encoding.

```

1 \documentclass[12pt,letterpaper,oneside,reqno]{amsart}
2 \usepackage{amsfonts}
3 \usepackage{amsmath}
4 \usepackage{amsymb}
5 \usepackage{amstext}
6 \usepackage{float}
7 \usepackage{mathrsfs}
8 \usepackage{colonequals}
9 \usepackage[font=small,labelfont=bf]{caption}
10 \usepackage[unicode,pdfpageLabels,hyperindex,colorlinks=true,linkcolor=red,urlcolor=blue,citecolor=red]{hyperref}
11 \usepackage{graphicx}
12 \usepackage{array}
13 \usepackage{enumitem}
14 \usepackage{toolbox}
15 \usepackage{physics}
16 \usepackage{booktabs}
17 \usepackage{url}
18 % margins and layout
19 \linespread{1.7}
20 \usepackage{...}
21 \apptocmd{\lopp}{\badness 1000\relax}{}{ }
22 \raggedbottom
23 \newcommand{\coeffA}[3][A]{\mathbf{#1}}\sub{#2}{#3}
24 \newcommand{\polynomialP}[4][P]{\mathbf{#1}}\sub{#2}{#3}\sub{#4}{#5}
25 \newcommand{\bernolli}[2][B]{\mathbf{#1}}\sub{#2}{#3}

```

Figure 1. Image example (from caption).

m/r	0	1	2	3	4	5	6	7
0	1							
1	1	6						
2	1	0	30					
3	1	-14	0	140				
4	1	-120	0	0	630			
5	1	-1386	660	0	0	2772		
6	1	-21840	18018	0	0	0	12012	
7	1	-450054	491400	-60060	0	0	0	51480

Table 1. Coefficients $\mathbf{A}_{m,r}$. See OEIS sequences [4, 5].

$$\begin{array}{c} \left[\begin{smallmatrix} a \\ b \end{smallmatrix} \right]_m \\ \left[\begin{smallmatrix} a \\ b \end{smallmatrix} \right]_m \end{array}$$

And for any natural m we have polynomial identity

$$x^m = \sum_{k=1}^m T(m, k) x^{[k]} \quad (1)$$

where $x^{[k]}$ denotes central factorial defined by

$$x^{[n]} = x \left(x + \frac{n}{2} - 1 \right)_{n-1}$$

where $(n)_k = n(n-1)(n-2) \cdots (n-k+1)$ denotes falling factorial in Knuth's notation. In particular,

$$x^{[n]} = x \left(x + \frac{n}{2} - 1 \right) \left(x + \frac{n}{2} - 1 \right) \cdots \left(x + \frac{n}{2} - n - 1 \right) = x \prod_{k=1}^{n-1} \left(x + \frac{n}{2} - k \right) \quad (2)$$

This is an equation reference (1).

Continuing similarly, we are able to derive the formula for multifold sums of powers, which is

Theorem 1.1 (Multifold sums of powers via Newton's series). *For non-negative integers r, n, m and an arbitrary integer t*

$$\sum^r n^m = \sum_{j=0}^m \Delta^j t^m \left[\left(\sum_{s=1}^r (-1)^{j+s-1} \binom{j+t-1}{j+s} \Sigma^{r-s} n^0 \right) + \binom{n-t+r}{j+r} \right]$$

Proof. By Newton's series for power and repeated applications of the segmented hockey stick identity. \square

Proposition 1.2 (Falling factorial).

$$(x)_n = x(x-1)(x-2)(x-3)\cdots(x-n+1) = \prod_{k=0}^{n-1} (x-k)$$

Proposition 1.3.

$$\frac{(x)_n}{n!} = \binom{x}{n}$$

1.1. Rising factorials.

Proposition 1.4 (Rising factorial).

$$x^{(n)} = x(x+1)(x+2)(x+3)\cdots(x+n-1) = \prod_{k=0}^{n-1} (x+k)$$

Proposition 1.5.

$$\frac{x^{(n)}}{n!} = \binom{x+n-1}{n}$$

1.2. Central factorials.

Lemma 1.6 (Central factorial).

$$n^{[k]} = n \left(n + \frac{k}{2} - 1 \right) \left(n + \frac{k}{2} - 2 \right) \cdots \left(n - \frac{k}{2} + 1 \right) = n \prod_{j=1}^{k-1} \left(n + \frac{k}{2} - j \right)$$

Proposition 1.7.

$$n^{[k]} = n \left(n + \frac{k}{2} - 1 \right)_{k-1}$$

1.3. Derivatives.

$$\frac{dx}{dy} = \frac{f(x+h) - f(x)}{h}$$

$$\frac{d^3x}{dy^3} = \frac{f(x+h) - f(x)}{h}$$

CONCLUSIONS

Conclusions of your manuscript.

Here is an itemize list with adjusted margins

- Conclusion 1
- Conclusion 2
- Conclusion 3

ACKNOWLEDGEMENTS

The author is grateful to [Full Name] for his valuable contribution [contribution] about the fact that [interesting claim].

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Metadata

- **Version:** 1.4.1-MATH-90.1+MATH-90.1a3a5bf
- **MSC2010:** 05A19, 05A10, 41A15, 11B68, 11B73, 11B83
- **Keywords:** Sums of powers, Newton's interpolation formula, Finite differences, Binomial coefficients, Faulhaber's formula, Bernoulli numbers, Bernoulli polynomials Interpolation, Approximation, Discrete convolution, Combinatorics, Polynomial identities, Central factorial numbers, Stirling numbers, Eulerian numbers, Worpitzky identity, Pascal's triangle, OEIS
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- **DOI:** <https://doi.org/10.5281/zenodo.18040979>
- **Web Version:** <https://kolosovpetro.github.io/math/test>
- **Sources:** github.com/kolosovpetro/github-latex-template
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