

# This is the title

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## Abstract

*Keywords:* keyword1, keyword2, keyword3

*In this paper there are examples of all the useful things you can do with  $\text{\LaTeX}$ . This document includes settings and examples for using the following packages: amsmath, amsthm, comment, enumitem, fancyhdr, geometry, graphicx, hyperref, makeidx, natbib, palatino, titlesec, totcibind, & verbatim plus the font packages: amsfonts, amssymb, cmmib57, eucal, (euftrak, euscript), & latexsym.*

## 1 Introduction

This paper is a template for writing  $\text{\LaTeX}$  papers for Brookline High School and other audiences.

In this paper there are examples of all the useful things you can do with  $\text{\LaTeX}$ . This document includes settings and examples for using the following packages: amsmath, amsthm, comment, enumitem, fancyhdr, geometry, graphicx, hyperref, makeidx, natbib, palatino, titlesec, totcibind, & verbatim plus the font packages: amsfonts, amssymb, cmmib57, eucal, (euftrak,

euscript), & latexsym

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### 1.1 The quick brown fox

The quick brown fox jumps over the lazy dog. Nam dui ligula, fringilla a, euismod sodales, sollicitudin

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<sup>\*†</sup> The authors wish to thank their families.

vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

## 2 This Section

In section 2 there are examples of the various types of lists<sup>1</sup>:

**Item 1 header** This is item one...The quick brown fox jumps over the lazy dog.

**Item 2 header** This is item one...The quick brown fox jumps over the lazy dog.

**Item 3 header** This is item one...The quick brown fox jumps over the lazy dog.

1) **Item 1 header** — This is item one...The quick brown fox jumps over the lazy dog.

2) **Item 2 header** — This is item two...The quick brown fox jumps over the lazy dog.

3) **Item 3 header** — This is item three...The quick brown fox jumps over the lazy dog.

► **Item 1 header** — This is item one...The quick

brown fox jumps over the lazy dog.

► **Item 2 header** — This is item two...The quick brown fox jumps over the lazy dog.

► **Item 3 header** — This is item three...The quick brown fox jumps over the lazy dog.

## 3 The Other Section

In section 3 there are examples of mathematics:

$$y = mx + b \quad \text{Linear} \quad (3.1)$$

$$f(x) = \int_{-\infty}^{+\infty} e^{i\theta} d\theta \quad \text{Integral} \quad (3.2)$$

$$z = 2^k - \binom{k}{1} 2^{k-1} + \binom{k}{2} 2^{k-2} \quad \text{Binomial} \quad (3.3)$$

## 4 The Code Section

```

1 # 34567890123456789012345678901234567890123456789012345678901234567890
2 #!/usr/local/env python3
3
4 # m4tacolor.py
5
6 # How many mxm patterns are there on an nxn chess board n >= m?
7
8 def getPattern(i, m, n, x):
9     """Return the ith mxm pattern in a nxn board represented by x."""
10    assert n >= m, 'n < m'
11    pattern, gap, mask = 0, n - m, 2 ** m - 1
12    for j in range(m):
13        pattern += x >> i + j * gap & mask << j * m
14        #print('*', m, n, i, j, gap, i + j * gap,
15        #      x >> i + j * gap, mask, mask << j * m, pattern)
16    return pattern
17
18 def getPatterns(m, n, x):
19     """Return the set of mxm patterns in a nxn board represented by x."""
20    assert n >= m, 'n < m'
21    patterns = set()
22    for i in range(n - m + 1):
23        for j in range(n - m + 1):
24            patterns.add(getPattern(i + j * n, m, n, x))
25    return patterns
26
27 def square(k, x):
28     """Return the unicode_black_or_white_square_based_on_the_kth_bit_of_x."""
29    #return '\u25a0' if 1 <= k & x else '\u25a1'
30    return 'X' if 1 <= k & x else 'O'
31
32 def board(x, n):
33     """Return the string representation of x as an nxn board."""
34    return '\n'.join([ ''.join(
35        [ square(i + j * n, x) for i in range(n) ] for j in range(n) ])
36        for j in range(n) ])
37
38 tests = [ (2, 5.), (4, 259.), (5, 262149.) ]
39 for m, n in tests:
40     f = 'm={}_n={}'
41     print(f.format(m, n))
42     f += '_board={0} + str(n * n) + 'b}_{len({})}'
43     for x in range(1000, 2 ** (n * n)):
44         patterns = getPatterns(m, n, x)
45         if len(patterns) == 2 ** (m * m):
46             print(f.format(m, n, x, len(patterns), patterns))
47             print(board(x, n))
48             break

```

Listing 1: m4tacolor.py module

<sup>1</sup>These correspond to the <dl>, <ol>, & <ul> HTML tags.

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## 5 Conclusion

This last section provides a citation so that a bibliography is automatically included for (Bretscher, 2009) & (Eliot, 1871).

## References

- Bretscher, O. (2009). *Linear algebra with applications* (4th). Pearson Prentice Hall. <http://isbn.nu/9780136009269>
- Eliot, G. (1871). *Middlemarch*. Penguin Books. <http://isbn.nu/9780141439549>