ASSIGNED FORUM PROBLEM 3

Soobin Rho

June 28, 2022

Chapter 8.4: Trigonometric Substitutions

24. $$\int_0^1 \frac{dx}{(4-x^2)^{\frac{3}{2}}} \tag{1}$$

Inserting Code Blocks

You can insert Jupyter Lab style code blocks. First, write your code on Jupyter Lab, export it as LaTeX by clicking `File`, `Export ... As`, and `LaTeX`.

When you export your Jupyter Lab file into a LaTeXfile, you'll see a lot of preambles on the top. These preambles are what makes the code cells the way they do. You don't need to copy any of those preambles because they have already been cloned into `coding.tex` and are automatically loaded by `main.tex`. Anyway, skip to the bottom of the exported file, where your code parts are. Your codes will start with `begin{tcolorbox}` and end with `end{tcolorbox}`.

Copy and paste these into anywhere on `body.tex`. Now, when you compile `main.tex`, every content on `body.tex` - including your codes - will render like this example pdf.

[3]:
```
# Comments
print('Hello world')
```

```
Hello world
```

Inserting Inline Codes

You can insert inline code with `inlinecode{...}`.

1 General Guidelines

Please read these instructions carefully. The objective of this template is to enable you in an easy way to style your article attractively in a style similar to that of the typeset journal. It should be emphasized, however, that the final appearance of your paper in print and in electronic media may likely vary to some extent from the presentation achieved in this template.

1.1 Level Headings: Subsections

You will usually want to divide your article into (numbered) sections and subsections (perhaps even subsubsections). Use to help organize your document as appropriate.

2 Mathematics

Here is some mathematics. For $A \in M_n$, the factorization $A = LU$, where L is unit lower triangular and U is upper triangular, is called the *LU decomposition*, or *LU factorization*. We can use such a factorization, when it exists, to solve the system $A\mathbf{x} = \mathbf{b}$ by first solving for the vector $\mathbf{y}$ in $L\mathbf{y} = \mathbf{b}$ and then solving $U\mathbf{x} = \mathbf{y}$. However, not every $n \times n$ matrix A has an LU decomposition. The following theorem provides conditions for the existence and uniqueness of an LU decomposition of a $n \times n$ matrix.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{2}$$

has all non-zero principle minors, A_1, A_2 and A_3. Therefore, there is a unique LU factorization with both L and U nonsingular given by

$$\begin{bmatrix} 1 & 5 & 1 \\ 1 & 4 & 2 \\ 4 & 10 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 4 & 10 & 1 \end{bmatrix} \begin{bmatrix} 1 & 5 & 1 \\ 0 & -1 & 1 \\ 0 & 0 & 12 \end{bmatrix}.$$

3 Definition, Theorem, Corollary

Definition 1. *Definitions are if and only if statements.*

```
\begin{definition}
Definitions are if and only if statements.
\end{definition}
```

Theorem 2 (Matrices with Infinitely Many LU Factorizations)**.** *For $A \in M_n$, if two or more of any first $(n-1)$ columns are linearly dependent or any of the first $(n-1)$ columns are 0, then A has infinitely many LU factorizations.*

Proof. We will prove only for the the case when $A \in M_3$.

$$dm + r = e \Rightarrow r = e - dm \tag{3}$$
$$dn + rp = f \Rightarrow p = \frac{f - dn}{r} \tag{4}$$
$$gm + s = h \Rightarrow s = h - gm \tag{5}$$
$$gn + sp + t = i \Rightarrow t = i - sp - gn \tag{6}$$

□

Corollary 3. *If x, then y.*

4 Examples

Here is an example of an example.

Example 1. *Let* $\{1,2,3\}$ *and* $\{2,1,3\}$ *be two lists of integers. Then, to check if the two lists are equal we would have,*

$$\texttt{\{1,2,3\} == \{2,1,3\}} \ .$$

```
\begin{example}
Let  $\{1,2,3\}$ and $\{2,1,3\}$ be two lists of integers.  Then, to check
\begin{center}
\texttt{ \{1,2,3\} == \{2,1,3\} }.
\end{center}\label{ex:equallists}
\end{example}
```

5 Lists

NAGJ uses the `outline` package.

Enumerated List

The following code produces an enumerated list. The enumerated list numbers each list item with Arabic numerals.

```
\begin{outline}[enumerate]
     \1 First Level
          \2 Second level
               \3 Third level
\end{outline}
```

1. First Level
   (a). Second level
      i. Third level

Itemized List

The following code produces an itemized list.

```
\begin{outline}
     \1 First item
          \2 Second level item
               \3 Third level sub-item
\end{outline}
```

- First Level
  – Second level

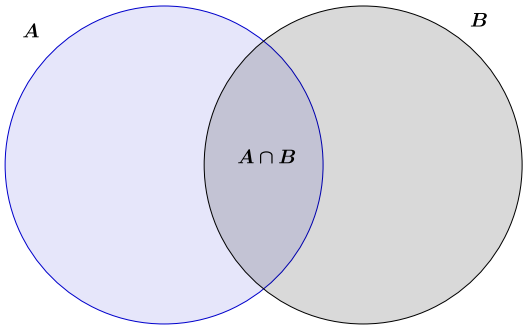
    * Third level

6 Tables and Figures

A **caption** that briefly describes the material is required for figures and tables. Any required information, such as photo credits or data source, may be included in captions. Furthermore, as part of the authorization to use that content, providers of this material may need a specific credit line, which might be placed in the caption (or wherever the provider has requested).

Figures

Figures should be high quality (1200 dpi for line art, 600 dpi for grayscale and 300 dpi for color, at the correct size). The preferred method of including graphics in the *North American GeoGebra Journal* is to export to TiKz. Other acceptable file formats include: EPS, PS, PNG, JPEG, or TIFF.



Tables

We use the `booktabs` package. Tables should present new information rather than duplicating what is in the text. Readers should be able to interpret the table without reference to the text. Please supply editable files.

Date	Time	Average	Standard Deviation
Jan 1	1100	4.7	0.6
Jan 2	2300	16.7	2.9
Jan 3	1400	11.4	3.5
Jan 4	1130	8.4	2.1
Jan 5	500	5.2	1.9
Jan 6	1700	7.9	2.2