

AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES
(AIMS RWANDA, KIGALI)

Name: Yusuf Brima
Course: Physical problem Solving

Assignment Number: 2230
Date: October 19, 2020

1 Theoretical exercise

Question 1.1. *Why is the sky blue?*

Theorem 1. *The boy is going to school.*

Proof. That is how it should be... □

1. Let $(V, \langle \cdot, \cdot \rangle)$ be an inner product space over a \mathbb{C} . Show that the map $\| \cdot \| : V \rightarrow \mathbb{R}$ defined by

$$\|\mathbf{u}\| = \sqrt{\langle \mathbf{u}, \mathbf{u} \rangle}$$

gives $(V, \| \cdot \|)$ the structure of a normed space.

2 Experimental exercise

Question 2.1. *The integer 3 is equal to 7.*

Proof. NO that is impossible...unless, we work in $\mathbb{Z}/4\mathbb{Z}$. □

3 Sub-questions

1. (a) This is my answer to the first part of question 1.
(b) My answer to the second part is found here.
2. (a) This is the first part of question 2.

4 Equations

The general form of a quadratic equation is given by

$$ax^2 + bx + c = 0,$$

where a, b and c are real numbers, and $a \neq 0$.

If I want to number the equation, it will look like this

$$ax^2 + bx + c = 0, \tag{1}$$

where a , b and c are real numbers, and $a \neq 0$. Equation (1) is the general form of a quadratic equation. Below is a system of equations

$$\int_a^b f(x)dx = (b-a) \left[\frac{f(a) + f(b)}{2} \right] \tag{2}$$

$$\int_a^b f(x)dx = \frac{h}{2} \sum_{k=1}^N (f(x_{k+1}) + f(x_k)) . \tag{3}$$

Equation (3) is the general form of equation (2), where the limit of integration is partitioned into N strips of equal intervals given by h .

5 Figures

5.1 One figure

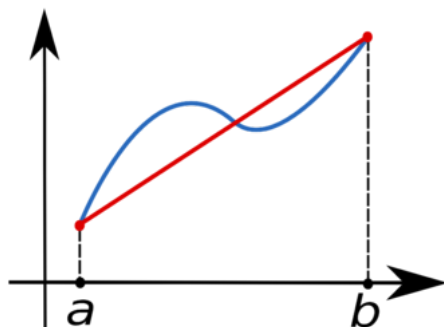


Figure 1: The simplest form of the trapezoidal rule.

Figure 1 has only one picture. For pictures appearing side by side see section 5.2.

5.2 Figures side by side

This is how you put two pictures side by side. Note that each subfigure has its own caption, and the entire figure has a caption which gives a more general description of the figures. Figure 2a is the same as figure 1. They both correspond to equation (2). Figure 2b corresponds to equation (3). Figure 2 is a pictorial description of equations (2), and (3).

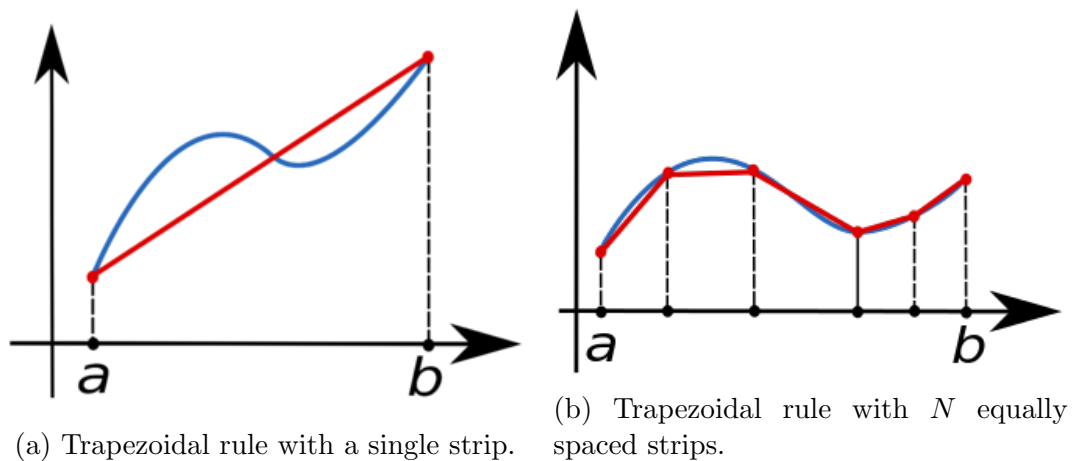


Figure 2: Trapezoidal rules

6 Bibliography

We shall only consider the simplest form of referencing. Later we shall look at the more general way of producing bibliography via bibtex. The format is basically given as follows:

```
\begin{thebibliography}{99}

\bibitem{notes} John W. Dower {\em Readings compiled for History
21.479.} 1991.

\bibitem{impj} The Japan Reader {\em Imperial Japan 1800-1945} 1973:
Random House, N.Y.

\bibitem{norman} E. H. Norman {\em Japan's emergence as a modern
state} 1940: International Secretariat, Institute of Pacific
Relations.

\bibitem{fo} Bob Tadashi Wakabayashi {\em Anti-Foreignism and Western
Learning in Early-Modern Japan} 1986: Harvard University Press.

\end{thebibliography}
```

6.1 Examples: How to cite

To cite a reference, you use `\cite{key}`. For example: For a compiled reading history see [1]. To know more about Western learning in modern Japan, we recommend [3, 1]. There is a comprehensive write up in [2] about the emergence of Japan as a modern state.

References

- [1] John W. Dower *Readings compiled for History 21.479*. 1991.
- [2] E. H. Norman *Japan's emergence as a modern state* 1940: International Secretariat, Institute of Pacific Relations.
- [3] Bob Tadashi Wakabayashi *Anti-Foreignism and Western Learning in Early-Modern Japan* 1986: Harvard University Press.