



# Inngangur að forritun í Python

Forritun fyrir byrjendur

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# 1. Inngangur

## 1.1 Tilgangur bókarinnar

Þessi bók fjallar um þau undirstöðu atriði sem þarf að kynna til að ná tökum á forritun í Python. Höfundur finnst mikilvægt að kenna námsefnið með íslenskum hugtökum þar sem ætlunin er að nota hana í kennslu í íslenskum framhaldsskólum. Ef nemendur ætla að leggja fyrir sig tölvunarfræði í framhaldssnámi er nauðsynlegt að búa yfir ríkulegu íðorðasafni, þess þá heldur ef nemandi hyggst framfleyta fræðunum. Hugtök verða þó líka sett fram á ensku því lesandi gæti óskað að fletta upp íterefni sem meira er til af á netinu á ensku en íslensku.

Ekki er búist við neinni fyrri kunnáttu við lestur þessarar bókar, hún á að geta staðið fyrir sínu án þess að lesandinn búi yfir nokkurri þekkingu á sviði tölvunarfræða eða forritunar. Ef slík þekking er fyrir hendi gæti lesandanum þótt ágætt að fara hratt í gegnum fyrri hluta bókarinnar, sem snýst um að kynna til sögunnar grunn virkni, lykilhugtök og málskipan, og einbeita sér að seinni hlutanum sem fjallar um hvernig megi beita Python í hlutbundinni forritun.

## 1.2 Hvers vegna Python?

Ástæður þess að Python er gott mál til þess að byrja á að skoða eru eftirfarandi

1. Python er *kvíkt tagað* forritunarmál, það þýðir að notandinn þarf ekki að gefa upp hvers konar *gagnatýpur* er unnið með. Þetta gerir það að verkum að notandinn þarf ekki að læra urmull af lykilorðum áður en byrjað er að forrita.
2. Python er frítt og aðgengilegt öllum helstu stýrikerfum og einnig er hægt að forrita yfir netið í vafra og því óþarfi fyrir notandann að setja nokkuð upp sé þess óskað.
3. Python er ekki alveg hlutbundið forritunarmál, sem gerir það að verkum að notandinn þarf ekki að læra hvernig á að beita hlutbundinni forritun fyrr en góð undirstaða er þegar komin.
4. Python er mikið notað, algengt mál svo það er praktískt að hafa undirstöðu skilning á því.

## 1.3 Citation

This statement requires citation [1]; this one is more specific [2, page 162].

## 1.4 Lists

Lists are useful to present information in a concise and/or ordered way<sup>1</sup>.

### 1.4.1 Numbered List

1. The first item
2. The second item
3. The third item

### 1.4.2 Bullet Points

- The first item
- The second item
- The third item

### 1.4.3 Descriptions and Definitions

**Name** Description

**Word** Definition

**Comment** Elaboration

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<sup>1</sup>Footnote example...



## 2. In-text Elements

### 2.1 Theorems

This is an example of theorems.

#### 2.1.1 Several equations

This is a theorem consisting of several equations.

**Theorem 2.1.1 — Name of the theorem.** In  $E = \mathbb{R}^n$  all norms are equivalent. It has the properties:

$$||\mathbf{x}| - |\mathbf{y}|| \leq |\mathbf{x} - \mathbf{y}| \quad (2.1)$$

$$||\sum_{i=1}^n \mathbf{x}_i|| \leq \sum_{i=1}^n ||\mathbf{x}_i|| \quad \text{where } n \text{ is a finite integer} \quad (2.2)$$

#### 2.1.2 Single Line

This is a theorem consisting of just one line.

**Theorem 2.1.2** A set  $\mathcal{D}(G)$  is dense in  $L^2(G)$ ,  $|\cdot|_0$ .

### 2.2 Definitions

This is an example of a definition. A definition could be mathematical or it could define a concept.

**Definition 2.2.1 — Definition name.** Given a vector space  $E$ , a norm on  $E$  is an application, denoted  $||\cdot||$ ,  $E$  in  $\mathbb{R}^+ = [0, +\infty[$  such that:

$$||\mathbf{x}|| = 0 \Rightarrow \mathbf{x} = \mathbf{0} \quad (2.3)$$

$$||\lambda \mathbf{x}|| = |\lambda| \cdot ||\mathbf{x}|| \quad (2.4)$$

$$||\mathbf{x} + \mathbf{y}|| \leq ||\mathbf{x}|| + ||\mathbf{y}|| \quad (2.5)$$

## 2.3 Notations

**Notation 2.1.** Given an open subset  $G$  of  $\mathbb{R}^n$ , the set of functions  $\varphi$  are:

1. Bounded support  $G$ ;
2. Infinitely differentiable;

a vector space is denoted by  $\mathcal{D}(G)$ .

## 2.4 Remarks

This is an example of a remark.



The concepts presented here are now in conventional employment in mathematics. Vector spaces are taken over the field  $\mathbb{K} = \mathbb{R}$ , however, established properties are easily extended to  $\mathbb{K} = \mathbb{C}$ .

## 2.5 Corollaries

This is an example of a corollary.

**Corollary 2.5.1 — Corollary name.** The concepts presented here are now in conventional employment in mathematics. Vector spaces are taken over the field  $\mathbb{K} = \mathbb{R}$ , however, established properties are easily extended to  $\mathbb{K} = \mathbb{C}$ .

## 2.6 Propositions

This is an example of propositions.

### 2.6.1 Several equations

**Proposition 2.6.1 — Proposition name.** It has the properties:

$$||\mathbf{x}| - |\mathbf{y}|| \leq \|\mathbf{x} - \mathbf{y}\| \quad (2.6)$$

$$\left\| \sum_{i=1}^n \mathbf{x}_i \right\| \leq \sum_{i=1}^n \|\mathbf{x}_i\| \quad \text{where } n \text{ is a finite integer} \quad (2.7)$$

### 2.6.2 Single Line

**Proposition 2.6.2** Let  $f, g \in L^2(G)$ ; if  $\forall \varphi \in \mathcal{D}(G)$ ,  $(f, \varphi)_0 = (g, \varphi)_0$  then  $f = g$ .

## 2.7 Examples

This is an example of examples.

### 2.7.1 Equation and Text

■ **Example 2.1** Let  $G = \{x \in \mathbb{R}^2 : |x| < 3\}$  and denoted by:  $x^0 = (1, 1)$ ; consider the function:

$$f(x) = \begin{cases} e^{|x|} & \text{si } |x - x^0| \leq 1/2 \\ 0 & \text{si } |x - x^0| > 1/2 \end{cases} \quad (2.8)$$

The function  $f$  has bounded support, we can take  $A = \{x \in \mathbb{R}^2 : |x - x^0| \leq 1/2 + \varepsilon\}$  for all  $\varepsilon \in ]0; 5/2 - \sqrt{2}[$ . ■

### 2.7.2 Paragraph of Text

■ **Example 2.2 — Example name.** Nam dui ligula, fringilla a, euismod sodales, sollicitudin 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. ■

## 2.8 Exercises

This is an example of an exercise.

**Exercise 2.1** This is a good place to ask a question to test learning progress or further cement ideas into students' minds. ■

## 2.9 Problems

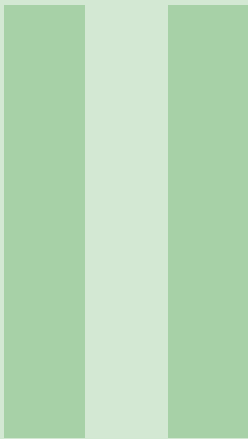
**Problem 2.1** What is the average airspeed velocity of an unladen swallow?

## 2.10 Vocabulary

Define a word to improve a students' vocabulary.

**Vocabulary 2.1 — Word.** Definition of word.





# Part Two

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## 3. Presenting Information

### 3.1 Table

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 3.1: Table caption

Referencing Table 3.1 in-text automatically.

### 3.2 Figure



Figure 3.1: Figure caption

Referencing Figure 3.1 in-text automatically.







## Bibliography

### Articles

- [1] James Smith. “Article title”. In: 14.6 (Mar. 2013), pages 1–8 (cited on page 7).

### Books

- [2] John Smith. *Book title*. 1st edition. Volume 3. 2. City: Publisher, Jan. 2012, pages 123–200 (cited on page 7).



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