BIOS1100 H17 uke 9

Lex Nederbragt

Ukens forelesning

- noen praktiske ting
- nytt stoff denne uken
- utvalgte øvelser

Flervalgsspørsmål (menti)

Alle oppgavertidligere, med svar finnes på

folk.uio.no/alexajo/bios1100/all.menti.html

Datalabben 3127

Vi har fått klager fra de ansatte som har kontor i gangen utenfor grupperommet/datalabben 3127.

Vennligst respekter deres behov for arbeidsro og ikke lag unødvendig støy i gangene.

Jupyterhub

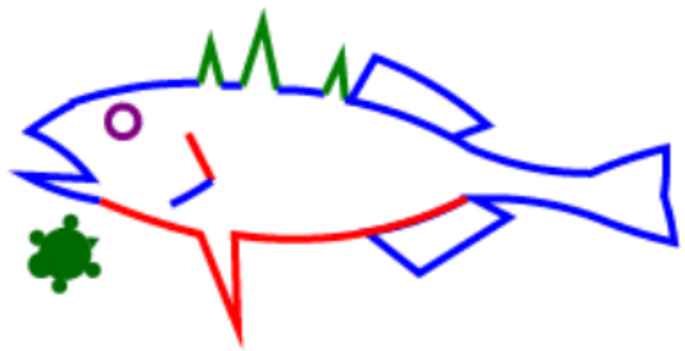
Snart slutt med `hub1`**,** `hub2` **og** `hub3`**, bare** `jupyterhub.uio.no`

Turtle konkuranse

Det kom inn seks notebooks.

Turtle konkuranse

Eivind Ronold

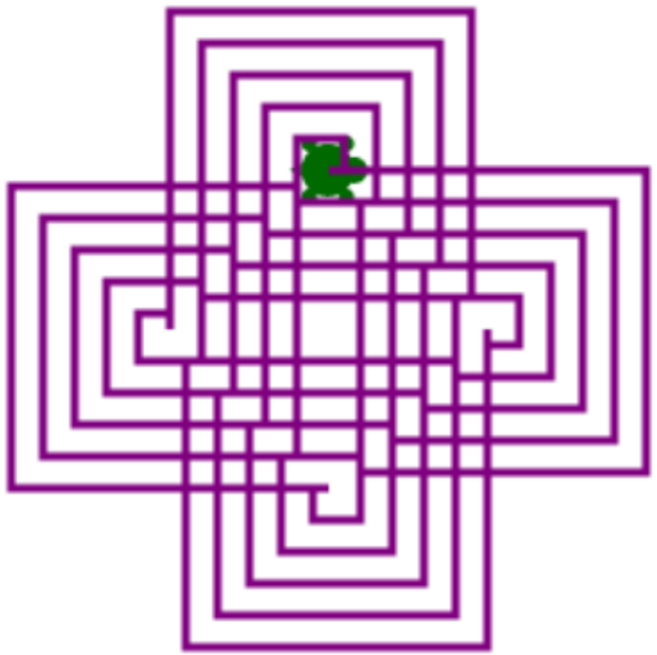


Turtle konkuranse

Even Garvang

Turtle konkuranse

Mari Stramrud

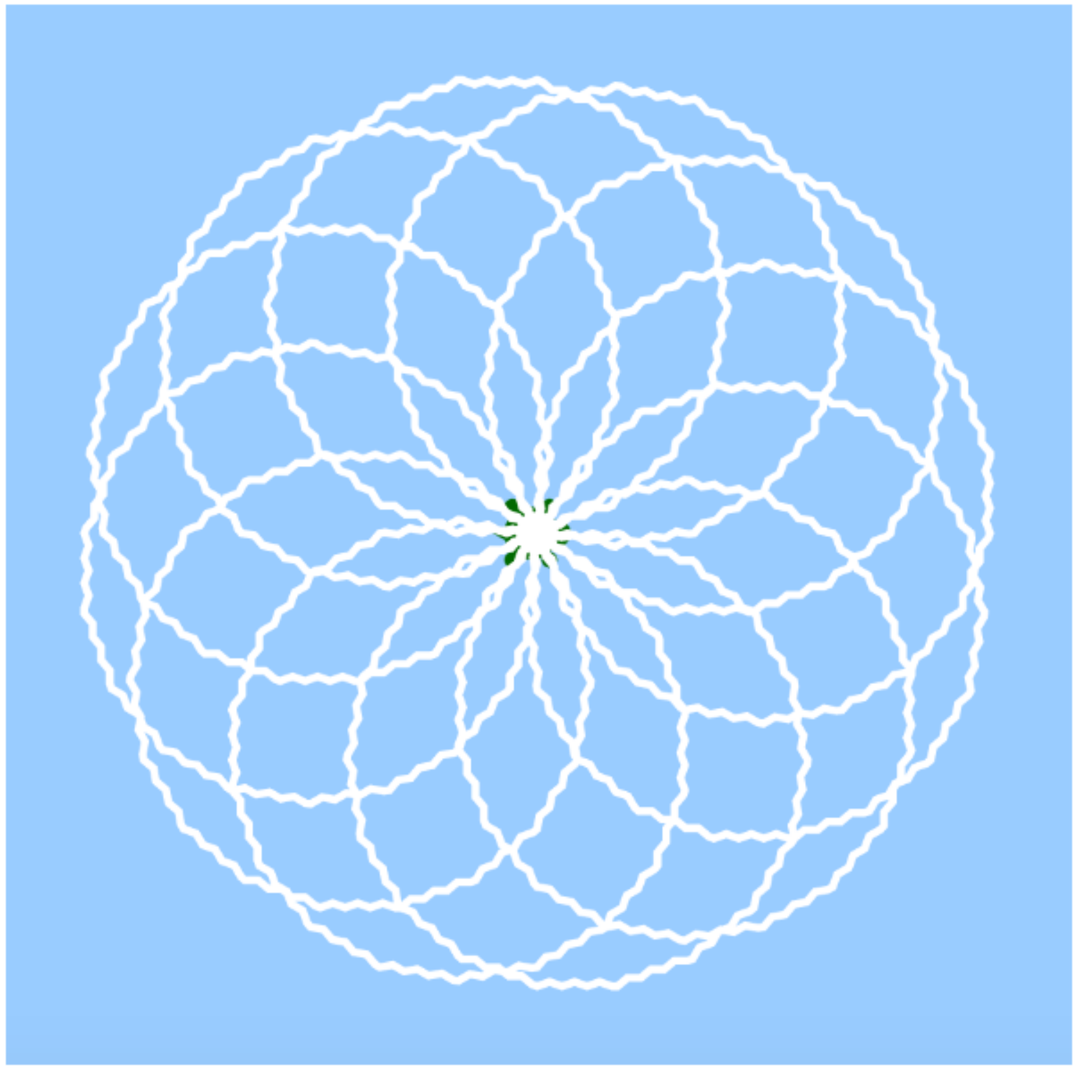


Turtle konkuranse

Markus Fjelde

Turtle konkuranse

Sanne Kristensen



Turtle konkuranse

Sindre Jakobsen

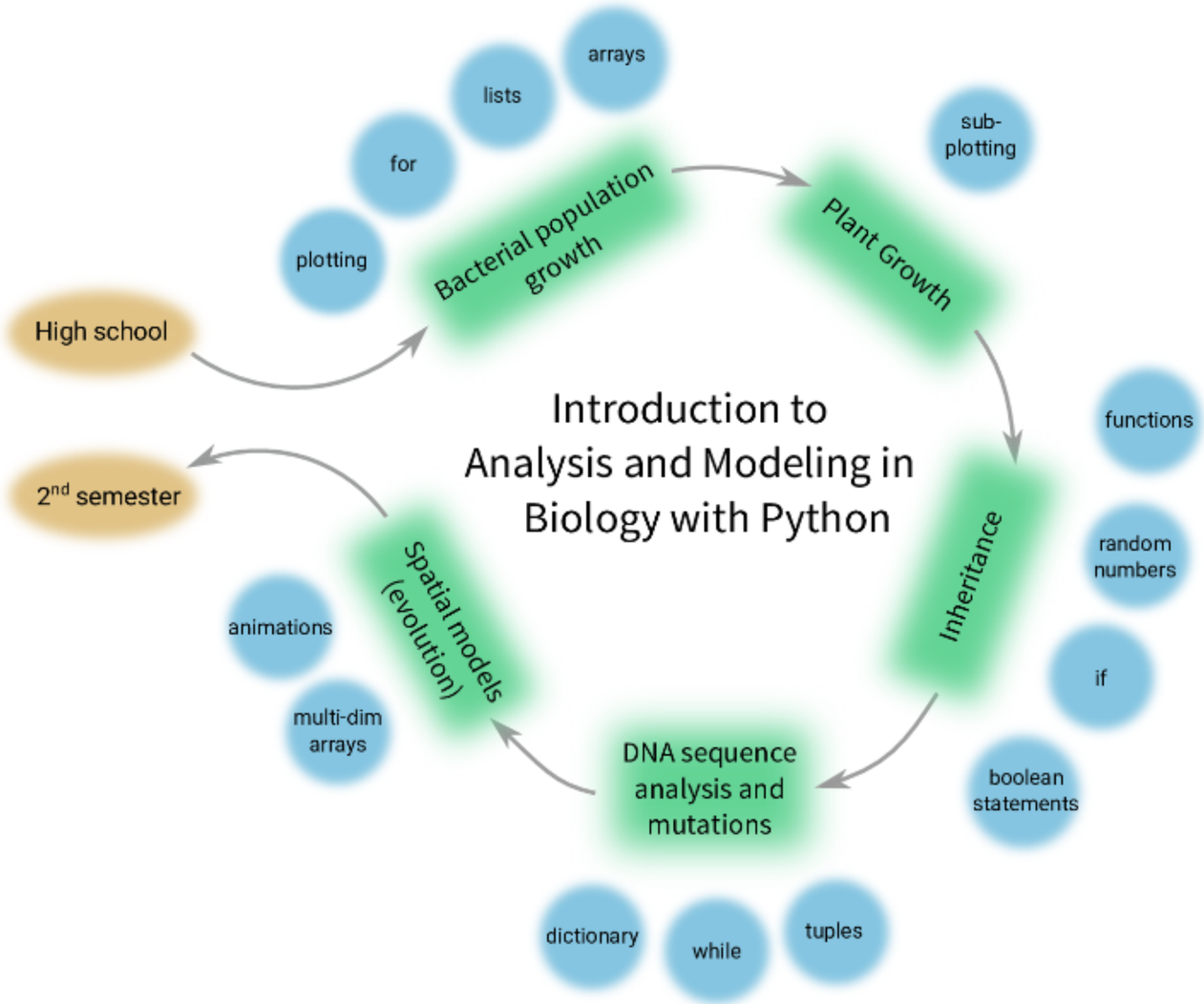
Turtle konkuranse

Og vinneren er

Turtle konkuranse

Og vinneren er Markus Fjelde

Undervisningsplan



Læringsmål denne uke

Biologi

- forstår restriksjonskutting og hvordan det kan brukes til å finne mutert DNA

Programmering

- string slicing
- modulo
- importere kode fra fil
- `+=` og varianter for assignments

Lenke til BIOS1110

- kutte samme DNA som blir brukt i BIOS1110 *med python*
- lage *virtuelt gelbildet* av gelen fra BIOS1110

Chapter 8 story: sickle cell anemia

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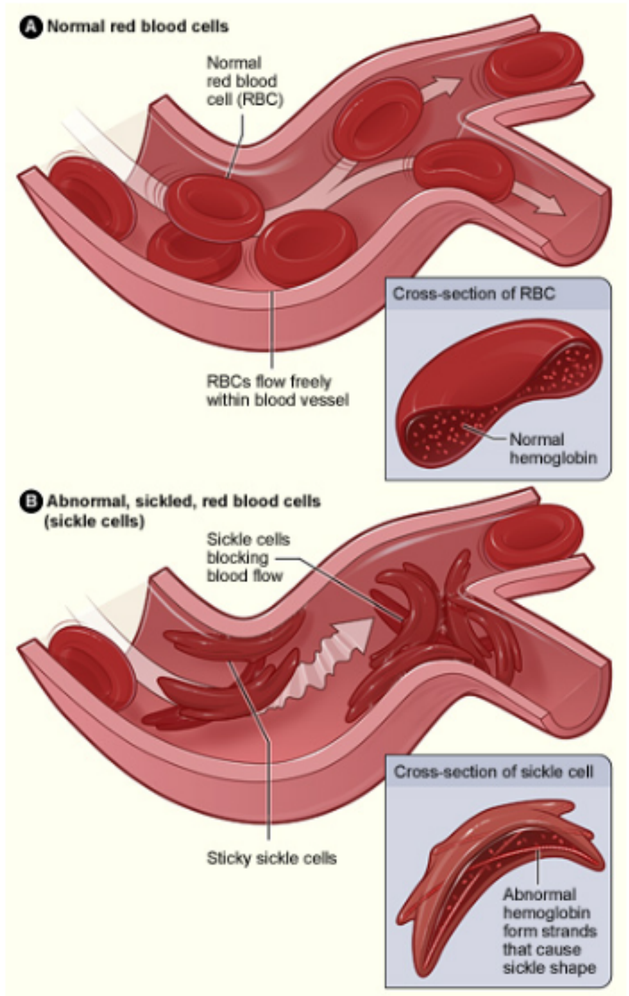
- **Sickle-cell anemia occurs because of a substitution in the DNA sequence that codes for one of these subunits.**

Chapter 8 story: sickle cell anemia

- Hemoglobin is the protein responsible for binding oxygen in red blood cells.
- It consists of four smaller proteins, called subunits.
- Sickle-cell anemia occurs because of a substitution in the DNA sequence that codes for one of these subunits.
- **A single base in the hemoglobin DNA is changed and the result is a genetic disorder where the red blood cells assume a sickle-like shape:**

Chapter 8 story: sickle cell anemia



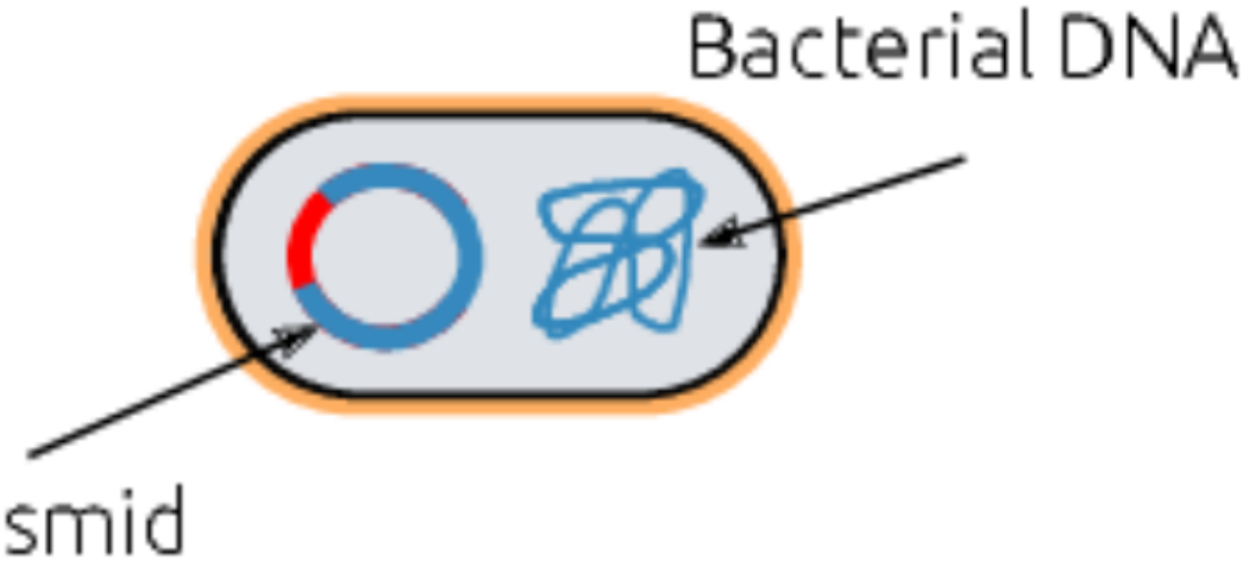
Normal hemoglobin subunit

ACATTTGCTTCTGACACAACTGTGTTCACTAGCAACCTCAAACAGACACCATGGTGCATCTGACTCCTGA
GGAGAAGTCTGCCGTTACTGCCCTGTGGGGCAAGGTGAACGTGGATGAAGTTGGTGGTGAGGCCCTGGGC
AGGCTGCTGGTGGTCTACCCTTGGACCCAGAGGTTCTTTGAGTCCTTTGGGGATCTGTCCACTCCTGATG
CTGTTATGGGCAACCCTAAGGTGAAGGCTCATGGCAAGAAAGTGCTCGGTGCCTTTAGTGATGGCCTGGC
TCACCTGGACAACCTCAAGGGCACCTTTGCCACACTGAGTGAGCTGCACTGTGACAAGCTGCACGTGGAT
CCTGAGAACTTCAGGCTCCTGGGCAACGTGCTGGTCTGTGTGCTGGCCCATCACTTTGGCAAAGAATTCA
CCCCACCAGTGCAGGCTGCCTATCAGAAAGTGGTGGCTGGTGTGGCTAATGCCCTGGCCCACAAGTATCA
CTAAGCTCGCTTTCTTGCTGTCCAATTTCTATTAAAGGTTCCTTTGTTCCCTAAGTCCAACTACTAAACT
GGGGGATATTATGAAGGGCCTTGAGCATCTGGATTCTGCCTAATAAAAAACATTTATTTTCATTGC

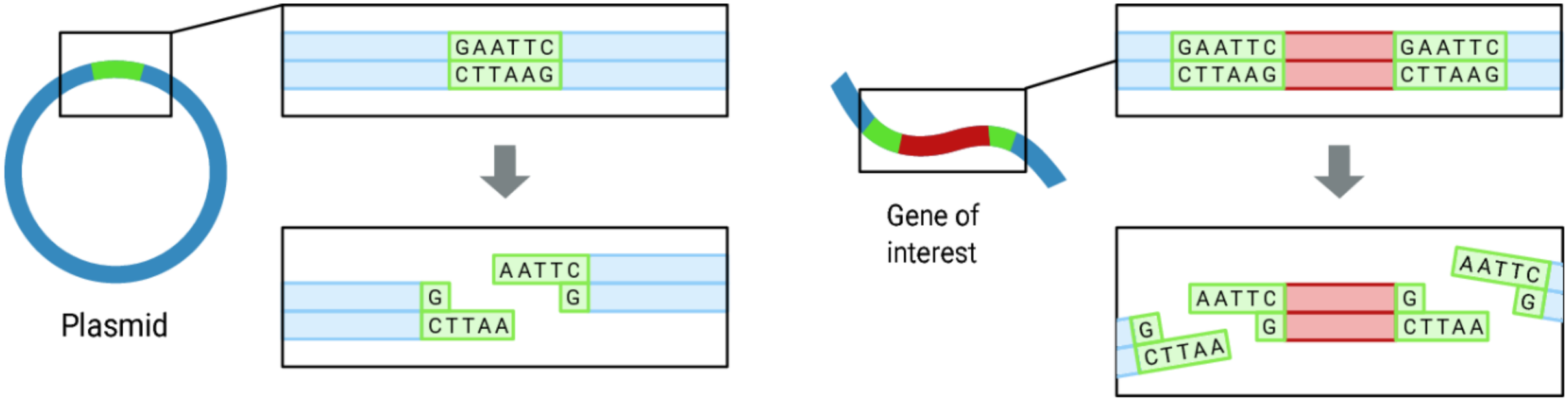
Mutated hemoglobin subunit

ACATTTGCTTCTGACACAACTGTGTTCACTAGCAACCTCAAACAGACACCATGGTGCATCTGACTCCTGT
GGAGAAGTCTGCCGTTACTGCCCTGTGGGGCAAGGTGAACGTGGATGAAGTTGGTGGTGAGGCCCTGGGC
AGGCTGCTGGTGGTCTACCCTTGGACCCAGAGGTTCTTTGAGTCCTTTGGGGATCTGTCCACTCCTGATG
CTGTTATGGGCAACCCTAAGGTGAAGGCTCATGGCAAGAAAGTGCTCGGTGCCTTTAGTGATGGCCTGGC
TCACCTGGACAACCTCAAGGGCACCTTTGCCACACTGAGTGAGCTGCACTGTGACAAGCTGCACGTGGAT
CCTGAGAACTTCAGGCTCCTGGGCAACGTGCTGGTCTGTGTGCTGGCCCATCACTTTGGCAAAGAATTCA
CCCCACCAGTGCAGGCTGCCTATCAGAAAGTGGTGGCTGGTGTGGCTAATGCCCTGGCCCACAAGTATCA
CTAAGCTCGCTTTCTTGCTGTCCAATTTCTATTAAAGGTTCCTTTGTTCCCTAAGTCCAACTACTAAACT
GGGGGATATTATGAAGGGCCTTGAGCATCTGGATTCTGCCTAATAAAAAACATTTATTTTCATTGC

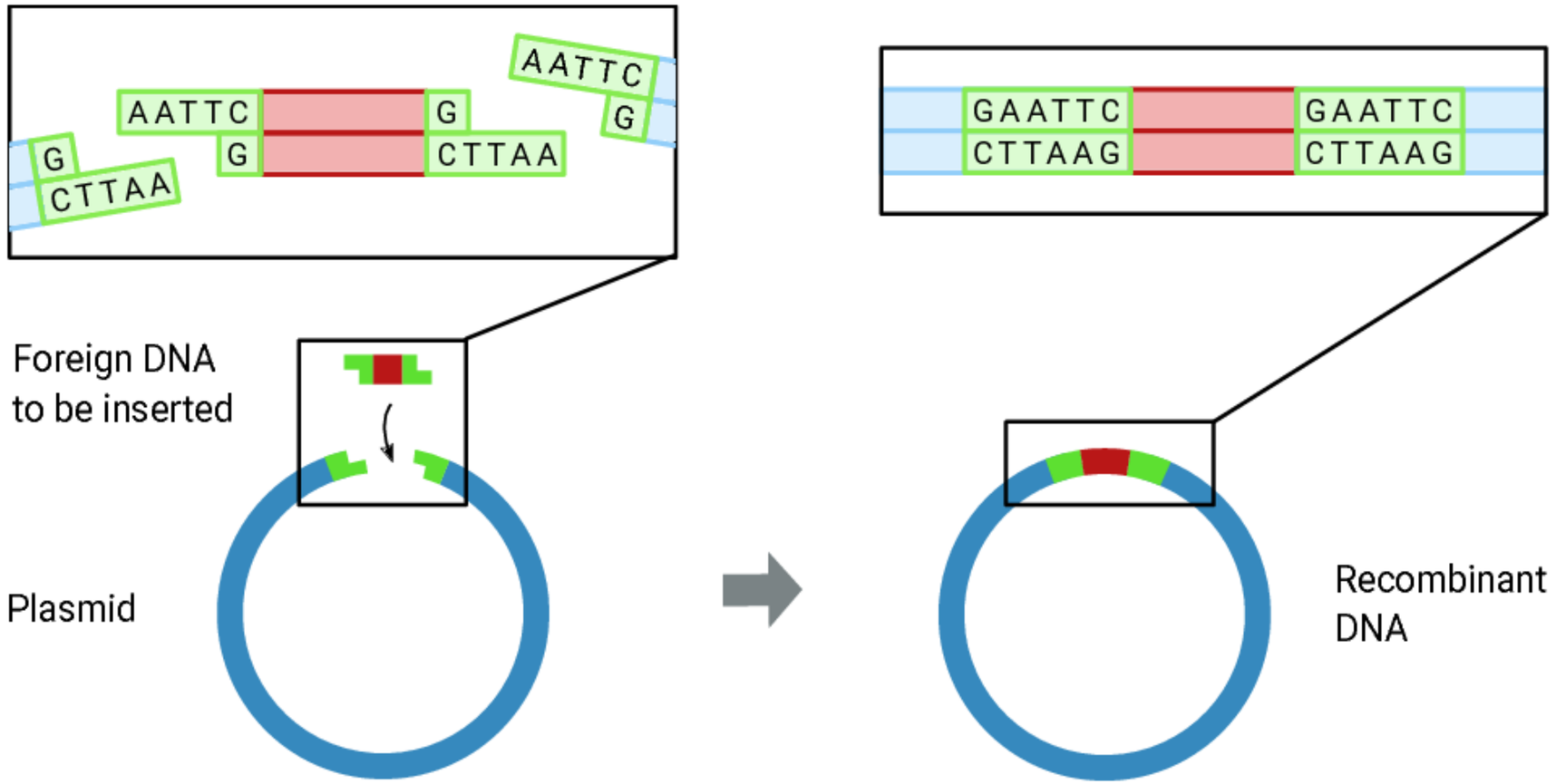
DNA kloning



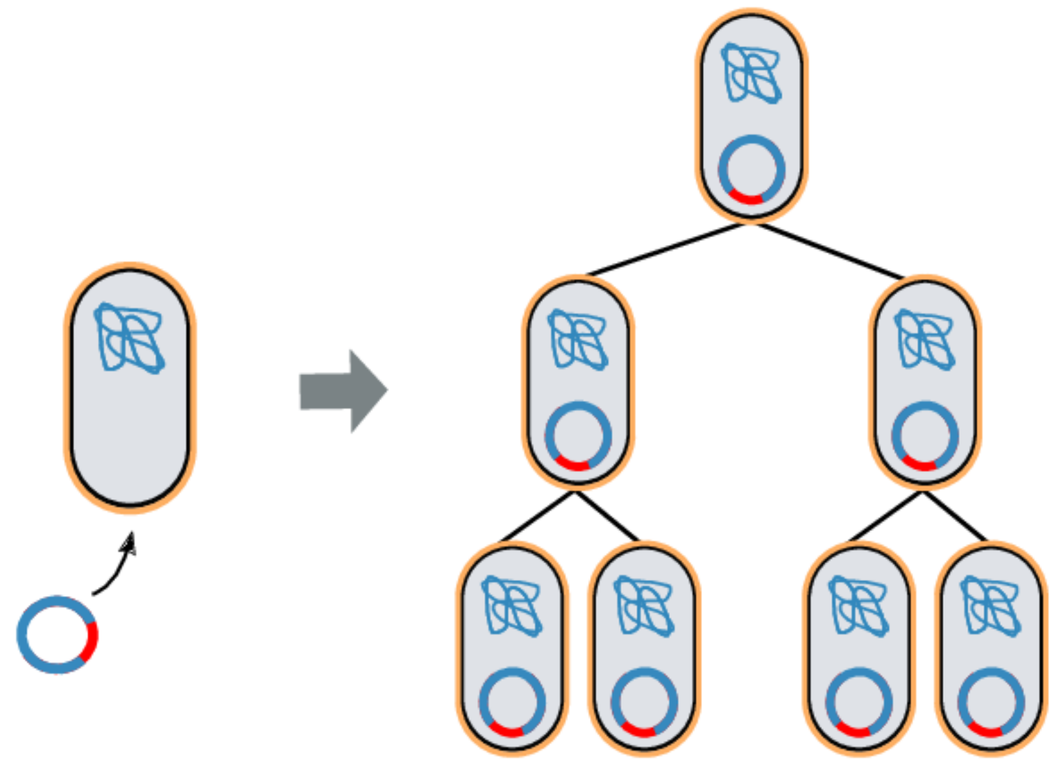
DNA kloning


GAATTC
CTTAAG
Plasmid
AATTC
G
G
CTTAA
Gene of
interest
GAATTC
CTTAAG
GAATTC
CTTAAG
AATTC
G
G
CTTAA
AATTC
G
G
CTTAA

DNA kloning


AATTC
G
AATTC
G
G
CTTAA
AATTC
G
CTTAA
Foreign DNA
to be inserted
Plasmid
GAATTC
CTTAAG
GAATTC
CTTAAG
Recombinant
DNA

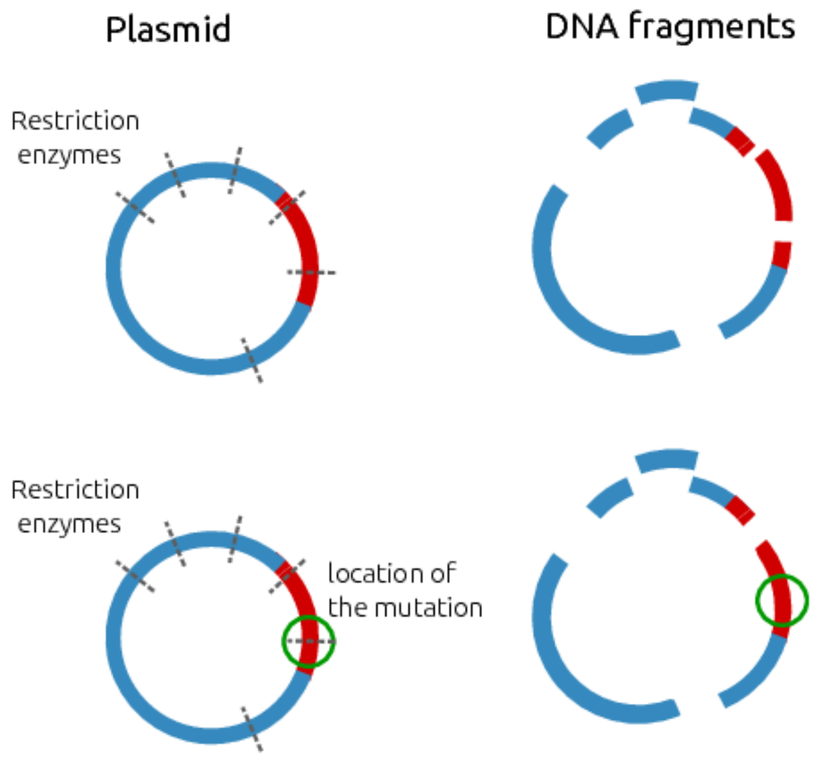
DNA kloning



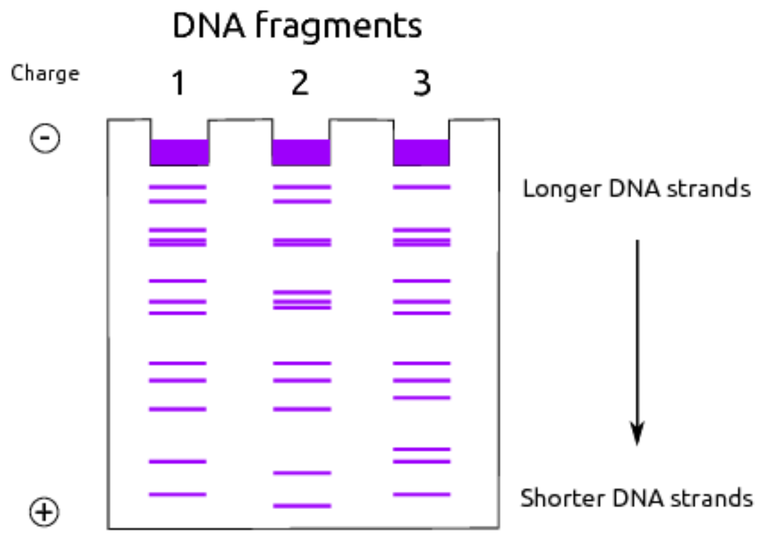
Plasmid insertion

Cell multiplication

Finne mutasjoner med hjelp av restriksjonskutting



Finne mutasjoner med hjelp av restriksjonskutting



Kutte lineær versus sirkulær DNA

Tavle

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Lenke til BIOS1110

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programmering

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- string slicing
- modulo
- `while` loops
- docstrings

Shorthands for assignments

Code	->Equivalent code
`n += 1`	`->n = n + 1`
`n -= 1`	`->n = n - 1`
`n *= 1`	`->n = n*1`
`n /= 1`	`->n = n/1`

programmering

- `+=` og varianter for assignments
- string slicing
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String slicing

A string in python is a list of characters

String slicing

```
my_list = [1, 2, 3, 10, 20, 30]
pint(my_list[0])
```

```
e_coli_dna = "AGCTTTTCATTCTGACTGCAACGGGCAATATGTCTCTGTGTGGATTAAAA"
print(e_coli_dna[0])
```

String slicing

```
my_list = [1, 2, 3, 10, 20, 30]
for element in my_list:
  print(element)
```

```
e_coli_dna = "AGCTTTTCATTCTGACTGCAACGGGCAATATGTCTCTGTGTGGATTAAAA"
for character in e_coli_dna:
  print(character)
```

List variabler kan endres

```
my_list = [100, 12, -3, 4.5, 62, 1.23]
my_list[4] = 501
print(my_list)
```

```
[100, 12, -3, 4.5, 501, 1.23]
```

String variabler er 'immutable'

```
my_string = 'Hella world!'
my_string[4] = 'o'
print(my_string)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-7-b938f45cef5d> in <module>()
      1 my_string = 'Hella world!'
----> 2 my_string[4] = 'o'
      3 print(my_string)

TypeError: 'str' object does not support item assignment
```

programmering

- `+=` og varianter for assignments
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Modulo

Spørsmål

Hvis jeg har ti mynter av 1 krone, som jeg skal dele med tre personer, hvor mange mynter har jeg da igjen?

Modulo

The modulo operator `%` gives you the remainder of a number divided by another number:

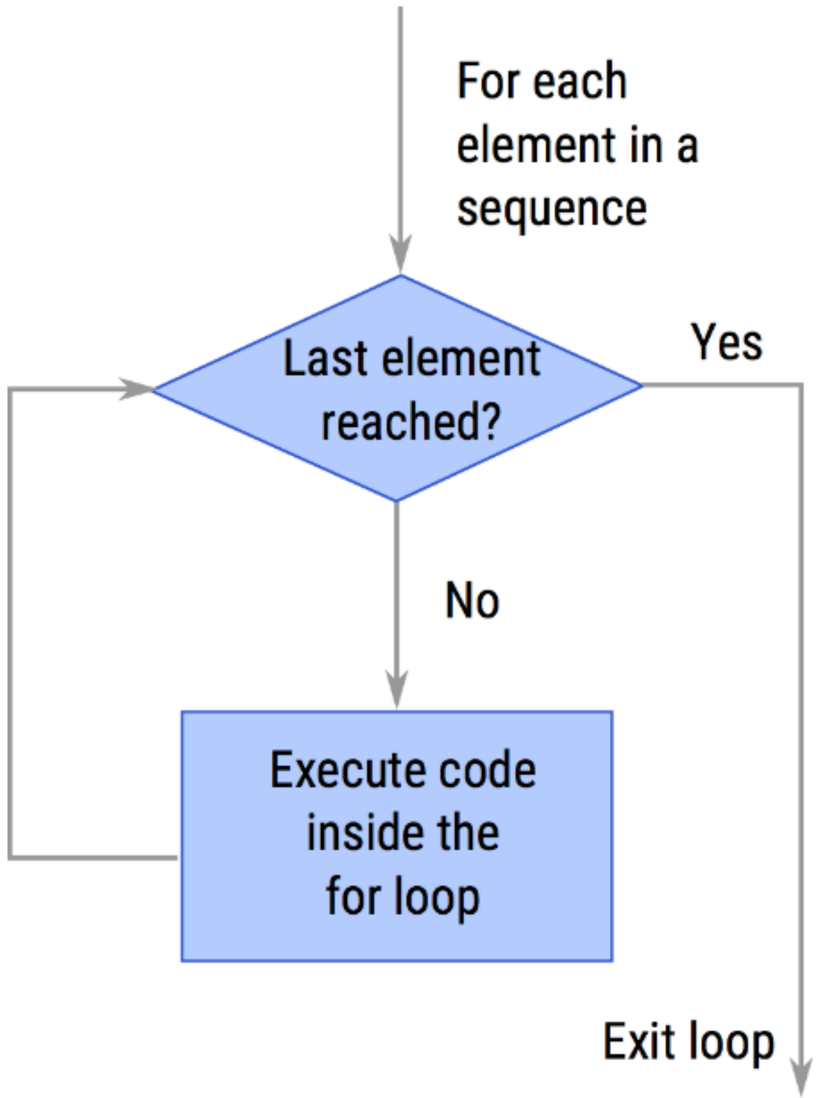
```
10 % 3 is 1
5 % 3 is 2
19 % 6 is 1
```

Flervalgsspørsmål: Percentage and fraction

Which python command prints 20% of the value of `x`?

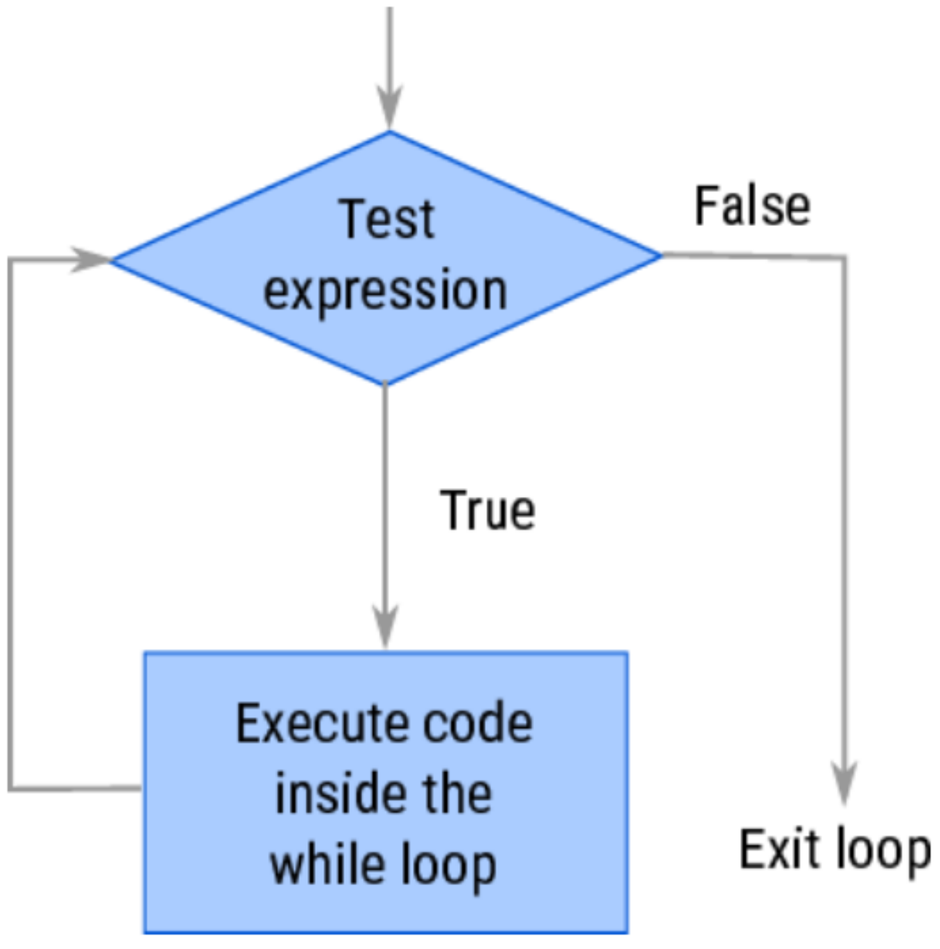
1. `print(20 % x)`
2. `print(20% * x)`
3. `print(x - 0.8 * x)`
4. `print(0.2 * x)`

(forelesning uke 5)

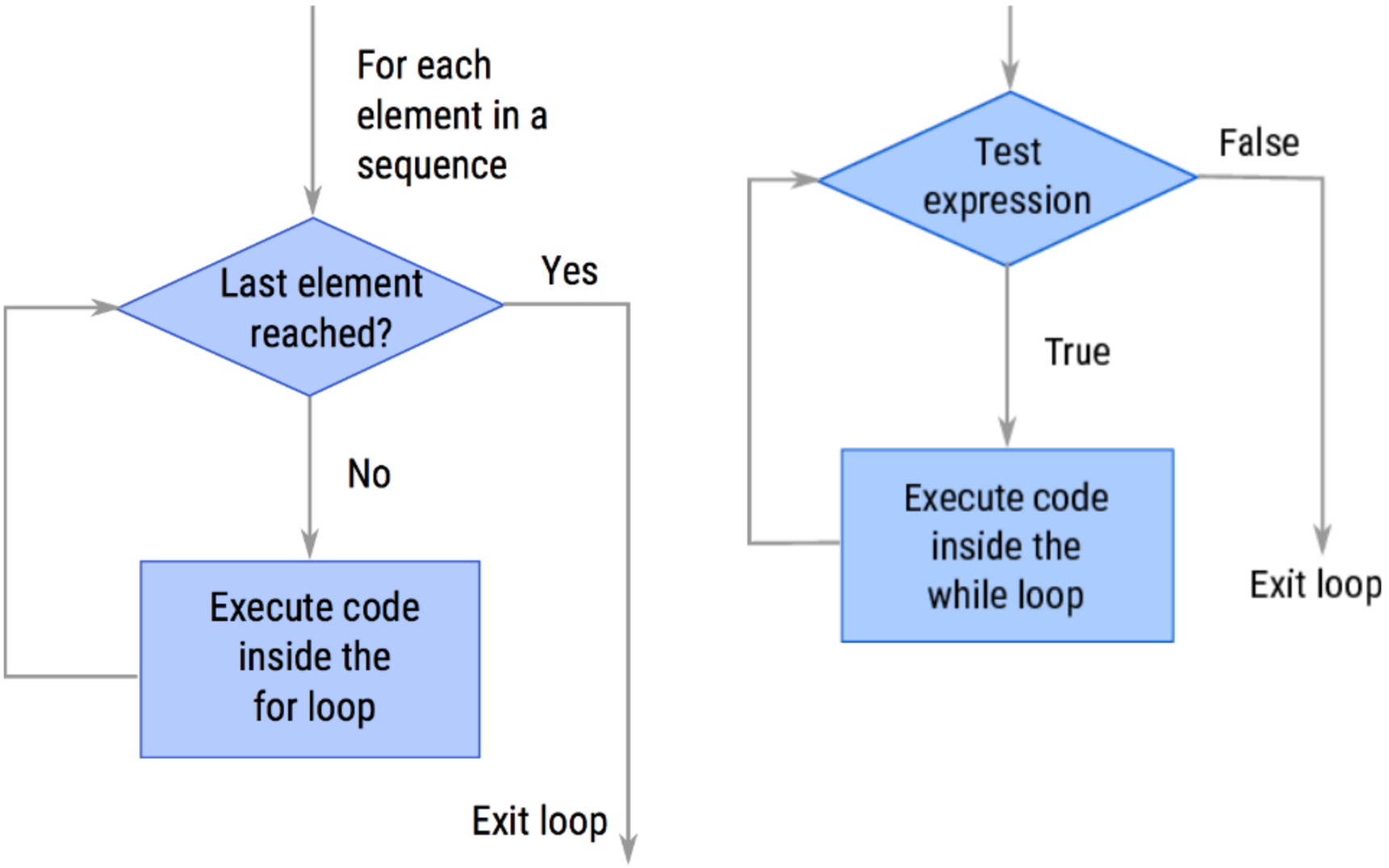

For each
element in a
sequence
Last element
reached?
Yes
No
Execute code
inside the
for loop
Exit loop

`while`-loops

A `while` loop repeats a set of statements as long as a specific condition is met.



`for` and `while`-loops



while-loops

```
a = 0
while a < 5:
    print("Inside the loop, a is now", a)
    a = a + 1

print("After the loop, a is", a)
```

```
Inside the loop, a is now 0
Inside the loop, a is now 1
Inside the loop, a is now 2
Inside the loop, a is now 3
Inside the loop, a is now 4
After the loop, a is 5
```

programmering

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docstrings

- A 'docstring' is a string with information about the function, simply describing what the function does

- Most-commonly these have """ (triple quotes) at the start and end

Utvalgte øvelser

- Exercise 2: Writing your own `max` function
- Exercise 4: Checking input