

Aarhus Universitet, Science and Technology, Computer Science

**Exam**

Introduction to Programming with Scientific Applications

Friday 9 August 2019, 9:00–11:00

Allowed aid: **None**

The exam questions are answered on the problem statement that is handed in at the end of the exam

*Tilladte hjælpemidler: **Ingen***

*Eksamensspørgsmålene besvares på opgaveformuleringen, som afleveres ved eksamenens slutning*

Student ID/*årskort* \_\_\_\_\_

Name/*navn* \_\_\_\_\_

## Information

The exam consists of a set of multiple-choice questions. The questions are answered on the problem statement **that is handed in**. For each question is stated the weight of the question compared to the full exam. Each sub-question has exactly one correct answer. You can select **at most one** answer for each sub-question, by marking the corresponding box with a cross. A sub-question is scored as follows:

- Marking the correct answer gives you 1 point.
- If you do not mark any answer you get 0 points.
- Marking a wrong answer gives you  $-\frac{1}{k-1}$  point, where  $k$  is the number of answer options.

For a question with weight  $v\%$  containing  $n$  sub-questions, where you score a total of  $s$  points, your score for the question will be  $\frac{s}{n} \cdot v\%$ . Note that is possible to get a negative score for a question.

*Dette eksamenssæt består af en mængde multiple-choice-opgaver. Opgaverne besvares på opgaveformuleringen **som afleveres**. For hver opgave er angivet opgavens andel af det samlede eksamenssæt. Hvert delspørgsmål har præcist et rigtigt svar. For hvert delspørgsmål, må man vælge **max ét svar** ved at afkrydse den tilsvarende rubrik. Et delspørgsmål bedømmes som følgende:*

- *Hvis du sætter kryds ved det rigtige svar, får du 1 point.*
- *Hvis du ikke sætter nogen krydser, får du 0 point.*
- *Hvis du sætter kryds ved et forkert svar, får du  $-\frac{1}{k-1}$  point, hvor  $k$  er antal svar-muligheder.*

*For en opgave med vægt  $v\%$  og med  $n$  delspørgsmål, hvor man opnår samlet  $s$  point, beregnes pointene for besvarelse af opgaven som  $\frac{s}{n} \cdot v\%$ . Bemærk at det er muligt at få negative point for en opgave.*

## Python version

In the following Python refers to Python 3.7.

*I det følgende antages at Python refererer til Python 3.7.*

### Question 1 (Types, 4 %)

What is the type of each of the below expressions ?  
*Hvad er typen af hvert af nedenstående udtryk ?*

	int	float	string	tuple	list	None
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
'1.0'	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(1,)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 / 2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 // 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1e1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Question 2 (Ranges, 4 %)

What is the result of each of the below expressions ?  
*Hvad er resultatet af hvert af nedenstående udtryk ?*

	0	1	2	3	4	5	6	7	8	9
<code>len(range(5))</code>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<code>len(range(2, 8, 3))</code>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<code>max(range(1, 5))</code>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<code>min(range(1, 5, 1))</code>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<code>min(range(5, 1, -1))</code>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Question 3 (Indexing, 4 %)

---

```
L = ['a', 'b', 'c']
```

---

What is the result of each of the below expressions ?  
*Hvad er resultatet af hvert af nedenstående udtryk ?*

	'a'	'b'	'c'	IndexError
L[0]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L[1]	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L[2]	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L[3]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
L[-1]	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L[-3]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Question 4 (Conditional, 4 %)

---

```
def f(x):
    answer = None
    if x == 1:
        if x == 2:
            answer = 'a'
        else:
            answer = 'b'
    else:
        if x >= 2:
            answer = 'c'
        if x >= 3:
            answer = 'd'
    return answer
```

---

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	'a'	'b'	'c'	'd'	None
f(0)	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input checked="" type="checkbox"/> E
f(1)	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
f(2)	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
f(3)	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E
f(4)	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E

### Question 5 (Boolean, 4 %)

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	False	True	0	1	ZeroDivisionError
False <b>or</b> True	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
<b>not</b> False	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
<b>not not</b> 0	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
0 // 1 <b>and</b> 1 // 0	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
1 // 0 <b>and</b> 0 // 1	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input checked="" type="checkbox"/> E

### Question 6 (for loops, 4 %)

---

```
for x in 'abc':
    for y in [1, 2, 3]:
        print(str(x) + str(y), end=' ')
```

---

What does the above code print ?

*Hvad udskriver ovenstående kode ?*

- |  |                                       |
|--|---------------------------------------|
| abc1 abc2 abc3                               | <input type="checkbox"/> A            |
| a1 b1 c1 a2 b2 c2 a3 b3 c3                   | <input type="checkbox"/> B            |
| a1 a2 a3 b1 b2 b3 c1 c2 c3                   | <input checked="" type="checkbox"/> C |
| 'a'1 'a'2 'a'3 'b'1 'b'2 'b'3 'c'1 'c'2 'c'3 | <input type="checkbox"/> D            |
| 'abc'1 'abc'2 'abc'3                         | <input type="checkbox"/> E            |

### Question 7 (while loops, 4 %)

---

```
x = 1
while x < 42:
    x *= 2
print(x)
```

---

What does the above code print ?

*Hvad udskriver ovenstående kode ?*

- |                            |                            |                            |                            |                                       |                            |                            |
|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------------------|----------------------------|----------------------------|
| 1                          | 2                          | 32                         | 42                         | 64                                    | 82                         | 84                         |
| <input type="checkbox"/> A | <input type="checkbox"/> B | <input type="checkbox"/> C | <input type="checkbox"/> D | <input checked="" type="checkbox"/> E | <input type="checkbox"/> F | <input type="checkbox"/> G |

### Question 8 (Dictionaries, 4 %)

---

```
D = {1: 2, 2: None, None: 'Nothing'}
```

---

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	1	2	None	'Nothing'	(2, None)	KeyError
D[1]	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F
D[None]	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F
D[D[D[1]]]	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F
D['Nothing']	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input checked="" type="checkbox"/> F
D[(1, 2)]	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input checked="" type="checkbox"/> F

### Question 9 (List slice, 4 %)

---

```
L = [0, 1, 2, 3, 4, 5]
```

---

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	[1]	[1,2]	[1,3]	[1,2,3]	[1,2,3,4]	[1,2,3,4,5]	[1,3,5]	[1,5]
L[1:3]	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H
L[1:3:2]	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H
L[1::2]	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input checked="" type="checkbox"/> G	<input type="checkbox"/> H
L[1::2][:2]	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input checked="" type="checkbox"/> H
L[5::-2][::-2]	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input checked="" type="checkbox"/> H

### Question 10 (Lists, 4 %)

---

```
A = [1]
```

```
B = A + A
```

```
C = B
```

```
A.append(2)
```

```
B.append(3)
```

---

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	[1]	[1,1]	[1,2]	[1,3]	[1,2,1,2]	[1,1,2]	[1,1,3]	[1,2,1,2,3]
A	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H
B	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input checked="" type="checkbox"/> G	<input type="checkbox"/> H
C	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input checked="" type="checkbox"/> G	<input type="checkbox"/> H

### Question 11 (Comprehension, 4 %)

What kind of expression is each of the below expressions ?

*Hvilken slags udtryk er hvert af nedenstående udtryk ?*

	list compre- hension	tuple compre- hension	set compre- hension	dictionary compre- hension	generator expression
<code>(x for x in (1,2,3))</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input checked="" type="checkbox"/> E
<code>[x for x in (1,2,3)]</code>	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
<code>{x for x in (1,2,3)}</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E
<code>{x: x for x in (1,2,3)}</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E
<code>{(x, x) for x in (1,2,3)}</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E

### Question 12 (Conditional expression, 4 %)

```
def f(x):
    return x + 1 if x % 3 else x - 1
```

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	0	1	2	3	4	5	6	7	8	9	10
<code>f(1)</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K
<code>f(3)</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K
<code>f(5)</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input checked="" type="checkbox"/> G	<input type="checkbox"/> H	<input type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K
<code>f(7)</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input checked="" type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K
<code>f(9)</code>	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input checked="" type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K

### Question 13 (Function call, 4 %)

```
def f(x, y, z):
    return x + 2 * y - 2 ** z

print(f(1, 2, 3))
```

What does the above code print ?

*Hvad udskriver ovenstående kode ?*

-5	-4	-3	-2	-1	0	1	2	3	4	5
<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K

### Question 14 (Function arguments, 4 %)

---

```
def f(x, y, *z):  
    return x * y * z  
  
print(f(1, 2, 3, 4))
```

---

What does the above code print ?      6    24    (6, 8)    (3, 4, 3, 4)  
*Hvad udskriver ovenstående kode ?*    ☐A    ☐B    ☐C    ☒

### Question 15 (Function scope, 4 %)

---

```
def f(x, y):  
    def g(x, z):  
        return (x, y, z)  
  
    return g(2 * x, 3 * y)  
  
z = 0  
print(f(1, 2))
```

---

What does the above code print ?      (1, 2, 0)    (2, 6, 0)    (2, 2, 6)    (2, None, 6)  
*Hvad udskriver ovenstående kode ?*    ☐A    ☐B    ☒C    ☐D

### Question 16 (Recursive function, 4 %)

---

```
def f(x):  
    if x > 0:  
        print(x, end=' ')  
        f(x - 1)  
        print(x, end=' ')  
  
f(3)
```

---

What does the above code print ?  
*Hvad udskriver ovenstående kode ?*

32123	321123	332211	33221	32100123	3210123
<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F



### Question 17 (Recursive data, 4 %)

```
def profile(tree):  
    if type(tree) is tuple:  
        return [d + 1 for child in tree for d in profile(child)]  
    else:  
        return [0]  
  
print(profile((((1, 2), 3), 4, (5, (6, 7)))))
```

What does the above program print?  
*Hvad udskriver ovenstående program?*

- ☐ A `[[[3, 3], 2], 1, [2, [3, 3]]]`
- ☒ B `[3, 3, 2, 1, 2, 3, 3]`
- ☐ C `[[[2, 2], 1], 0, [1, [2, 2]]]`
- ☐ D `[2, 2, 1, 0, 1, 2, 2]`

### Question 18 (Generator, 4 %)

```
def fix(seq):  
    for x in seq:  
        if x >= 0:  
            yield x  
  
seq = fix((2, -3, 1, 0, -2, 4))  
  
print(next(seq), end=' ')  
print(next(seq), end=' ')  
print(tuple(seq), end=' ')
```

What does the above code print ?  
*Hvad udskriver ovenstående kode ?*

- ☐ A `2 1 0 4`
- ☒ B `2 1 (0, 4)`
- ☐ C `2 2 (2, 1, 0, 4)`
- ☐ D `2 2 2 1 0 4`

### Question 19 (Generator expression, 4 %)

---

```
squares = (x * x for x in range(1, 5))

print(sum(squares) + sum(squares))
```

---

What does the above code print ?      10   15   20   30   55   60   110  
*Hvad udskriver ovenstående kode ?*    ☐A   ☐B   ☐C   ☒D   ☐E   ☐F   ☐G

### Question 20 (lambda, 4 %)

---

```
def compose(f, h):
    return lambda *args : f(h(*args))

square = lambda x: x ** 2
inc = lambda x: x + 1

print(compose(inc, compose(square, inc))(1))
```

---

What does the above code print ?      1   2   3   4   5   6   7   8   9   10  
*Hvad udskriver ovenstående kode ?*    ☐A   ☐B   ☐C   ☐D   ☒E   ☐F   ☐G   ☐H   ☐I   ☐J

### Question 21 (Classes, 4 %)

---

```
class A:
    count = 0

    def __init__(self, value=0):
        self.element = self.count + value
        A.count += 1

a = A(3)
b = A()
```

---

What is the result of each of the below expressions ?  
*Hvad er resultatet af hvert af nedenstående udtryk ?*

	0	1	2	3	4	5	AttributeError
A.count	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G
A.element	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input checked="" type="checkbox"/> G
a.count	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G
a.element	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G
b.count	<input type="checkbox"/> A	<input type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G
b.element	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G

## Question 22 (Inheritance, 4 %)

---

```
class A:
    def f(self, x):
        return self.g(x) * self.g(x)

    def g(self, x):
        return x + 1

class B(A):
    def f(self, x):
        return x + super().f(x)

    def g(self, x):
        return x - 1
```

---

What is the result of each of the below expressions ?

*Hvad er resultatet af hvert af nedenstående udtryk ?*

	0	1	2	3	4	5	6	7	8	9	10	AttributeError
A().f(2)	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input type="checkbox"/> I	<input checked="" type="checkbox"/> J	<input type="checkbox"/> K	<input type="checkbox"/> L
B().f(2)	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F	<input type="checkbox"/> G	<input type="checkbox"/> H	<input type="checkbox"/> I	<input type="checkbox"/> J	<input type="checkbox"/> K	<input type="checkbox"/> L

## Question 23 (Decorator, 4 %)

---

```
def S(prefix, suffix):
    def decorator(fn):
        def wrapper(*args):
            return prefix + str(fn(*args)) + suffix
        return wrapper
    return decorator

@S('<', '>')
def square(x):
    return x * x

result = square(2) + square(3)
```

---

What value has **result** ?

*Hvilken værdi har result ?*

13	'13'	'49'	'<13>'	'<49>'	'<4><9>'
<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input checked="" type="checkbox"/> F

### Question 24 (Exceptions, 4 %)

```
try:
    print('A', end='')
    x = 1 / 0
    print('B', end='')
except Exception:
    print('C', end='')
except ZeroDivisionError:
    print('D', end='')
finally:
    print('E', end='')
```

What does the above code print ?

*Hvad udskriver ovenstående kode ?*

A	AB	AC	AD	AE	ACE	ADE	ACD	ACDE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Question 25 (Numpy, 4 %)

```
import numpy as np

A = np.zeros((3, 2))
B = np.zeros((2, 7))
C = A @ B

print(C.shape)
```

What does the above code print ?

*Hvad udskriver ovenstående kode ?*

0	(6, 14)	(5, 9)	(3, 7)	(3, 2, 2, 7)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>