ℹ Forside

UNIVERSITY OF OSLO
Faculty of mathematics and natural sciences

Midterm exam IN1900, IN-KJM 1900, INF1100 and MAT-IN1105
Day of examination: 10 October 2018
Attachments: None
Permitted aids: None

- The exam set consists of 25 multiple-choice questions.
- For each question there is one correct answer.
- Each correct answer gives one point.

1   Hva skrives ut?

What is printed in the terminal window when the following code is run?

a = 4
b = a
a = 2
print('b =', b)

Select one alternative:

- ○ An error message

- ○ 4

- ○ b = 4

- ○ b = 2

- ○ 2

Maximum marks: 1

2   Hva skrives ut?

What is printed when the following code is run?

def f(x,y):
**   return 2*x + y**
x = 2
y = 3

print(f(1,2))
Select one alternative:

- ○ 4

- ○ An error message

- ○ 7

- ○ 3

Maximum marks: 1

3 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
def f(x):
    return x**2 - 2


y = 2
def g(y):
    return 2*y


y = 4
print(y, g(f(2)))
```

Select one alternative:

○ An error message

○ 4 4

○ 2 4

○ 4 28

Maximum marks: 1

4 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
def H(x):
    if x < 0:
        return 0.0
    else:
        return 1.0


print(H(0.0))
```

Select one alternative:

○ 1.0

○ 0.5
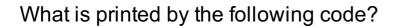
○ An error message

○ 0.0

Maximum marks: 1

5 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
a = 2
b = 3
def sum(a,b):
    return a + b
s = sum(a,a)
a = 4

print(a,s)
```

Select one alternative:

○ 4 4

○ 2 4

○ An error message

○ 4 8

Maximum marks: 1

6 Lister

Which of the following lines does **not** result in a list of length 6?
Select one alternative:

○ a = [0]*6

○ a = [3*e for e in range(2)]

○ a = [4,5]+[1,2,3,4]

○ a = list(range(6))

Maximum marks: 1

7 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
s = [1,2,3,4]
for i in range(len(s)):
    s[i] = s[i]**2

print(s[3])
```

Select one alternative:

○ 3

○ 9

○ An error message

○ 16

○ 4

Maximum marks: 1

8   Hva skrives ut?

What is printed by the following code?

```
formula = '2*x+4'
x = 2
print(eval(formula))
```

Select one alternative:

- ○ 2*x+4

- ○ 8

- ○ An error message

- ○ 6

Maximum marks: 1

9   Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
s = -2
for i in range(2,5,2):
    s += i
print(s)
```

Select one alternative:

- ○ 6

- ○ 4

- ○ An error message

- ○ 0

- ○ 2

Maximum marks: 1

10   Hva skrives ut?

What is printed by the following code?

```
dx = 0.25
b = [dx*i for i in range(5)]
print(b[-1])
```

Select one alternative:

- ○ 1.0

- ○ An error message

- ○ 1.25

- ○ 0.0

- ○ 0.75

Maximum marks: 1

11 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
C = -20
dC = 5
Clist = []
Flist = []
while C <= 40:
    Clist.append(C)
    Flist.append(2*C + 30)
    C = C + dC

print(Clist[-1],Flist[-1])
```

Select one alternative:

- ○ 110

- ○ 35 110

- ○ 45 120

- ○ An error message

- ○ 100

- ○ 40 110

Maximum marks: 1

12 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
first_names = ['Minch','Han','Luke']
last_names = ['Yoda', 'Solo', 'Skywalker']
names = first_names + last_names
print(names[len(names)])
```

Select one alternative:

- ○ Skywalker

- ○ Luke Skywalker

- ○ An error message

- ○ Luke

- ○ Minch

Maximum marks: 1

13 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
import sys
try:
    v0 = float(sys.argv[1])
    g = float(sys.argv[2])
except IndexError:
    print('Please provide two command line arguments')
    sys.exit()
except ValueError:
    print('The arguments must be numbers')
    sys.exit()

def y(t,v0,g):
    return v0*t-0.5*g*t**2

print(y(0.6,v0,g))
```

The code is in a file ball.py, and is run in the following way:
Terminal> python ball.py 5 9.81
Select one alternative:

- ○ 1.2342

- ○ An error message

- ○ Please provide two command line arguments

- ○ Nothing

- ○ The arguments must be numbers

Maximum marks: 1

14 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
def volume(x,y,z):
    return x*y*z

def test_volume():
    x = 2.0
    y = 3.0
```

```
z = 4.0
tol = 1e-8
success = abs(volume(x,y,z)-24)<tol
msg = 'Something wrong in volume'
assert success, msg
```

```
test_volume()
```

Select one alternative:

○ Something wrong in volume

○ Nothing

○ Success

Maximum marks: 1

15 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
for i in range(3):
    for j in range(i):
        if j < i:
            print(i,j, end=' ')
```

(The argument end=' ' sent to the print function replaces the usual linebreak after each print with a space.)

Select one alternative:

○ 1 0 2 0 2 1

○ 0 0 1 0 2 1 0

○ 0 1 2 3 4

○ 0 1 2 0 1 2

Maximum marks: 1

16 Hva skrives ut?

What is printed by the following code?

```
import numpy as np
a = np.linspace(0, 2.5, 6)
b = a*2
print(b)
```

Select one alternative:

- ○ [0. 0.5 1. 1.5 2. 2.5 0. 0.5 1. 1.5 2. 2.5]

- ○ [0.]

- ○ [0. 0.5 1. 1.5 2. 2.5]

- ○ [0. 1. 2. 3. 4. 5.]

- ○ [0. 1. 2. 3. 4. 5. 6.]

Maximum marks: 1

17 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
x = 6
y = -2
c = x >= 10 or y != -2

print(c)
```

Select one alternative:

- ○ 6

- ○ False

- ○ True

- ○ An error message

Maximum marks: 1

18 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
def find_max(a):
    max_a = -100
    for e in a:
        if e > max_a:
            max_a = e
    return max_a

a = [0,2,4,5,10,8,3,4,6]
print(find_max(a) == max(a))
```

Select one alternative:

- ○ -100

- ○ 0

- ○ False

- ○ 10

- ○ True

Maximum marks: 1

19 Hva skrives ut?

What is printed in the terminal window when the following code is run?

line = "All work and no play makes Jack a dull boy"
words = line.split()
print(type(words),type(words[-1]))

Select one alternative:

- ○ <class 'str'><class 'list'>

- ○ <class 'str'> <class 'str'>

- ○ <class 'list'> <class 'str'>

- ○ <class 'list'> <class 'list'>

Maximum marks: 1

20 Hvilket utsagn er riktig?

One of the following statements is correct. Which one?
Select one alternative:

- ○ A function must always include a return statement.

- ○ A function can only have one return statement.

- ○ Vectorization means to avoid explicit for-loops in the code.

- ○ A test function should always take at least one argument.

Maximum marks: 1

21 Hvilket funksjonskall?

The following function estimates the derivative of a function f in a point x. Both f and x are passed as arguments to the function.

from math import *

def num_diff(f,x,h=1e-6):
  return (f(x+h)-f(x))/h

We want to use the function to evaluate the derivative of cos(x) in x=pi/2. Which function call is correct?

Select one alternative:

- ○ d = num_diff(sin(x),pi/2,1e-6)

- ○ d = num_diff(cos,pi/2)

- ○ d = num_diff(cos(pi/2))

- ○ d = num_diff(cos(x),pi/2,1e-6)

- ○ d = num_diff(cos(),pi/2,h=1e-6)

Maximum marks: 1

22 Hva skrives ut?

What is printed in the terminal window when the following code is run?

```
import sys
A = [['-1','0','1'],['0','0','0'],['10','9','8']]
try:
    b = int(A[2])
except IndexError:
    print('A has length %d' %len(A))
    sys.exit(1)
except TypeError:
    print('Cannot convert %s to int' %A[2])
    sys.exit(1)

print(b)
```

Select one alternative:

- ○ 0

- ○ Cannot convert ['0','0','0'] to int

- ○ Cannot convert ['10','9','8'] to int

- ○ A has length 9

- ○ A has length 3

Maximum marks: 1

23 Plotting

The Python function **pi_approx** in the code below implements the sum

$$f = 4 \sum_{k=1}^{n} \frac{-1^{k+1}}{2k-1}$$

What does the rest of the code do?

```
import matplotlib.pyplot as plt
from math import pi

def pi_approx(n):
    a = 0
    for k in range(1,n+1):
        a += (-1)**(k+1)/(2*k-1)
```

```
    return 4*a

index_list = range(1,51)
a_list = []
for i in index_list:
    a_list.append(pi_approx(i))
plt.plot(index_list,a_list)
plt.show()
```

Select one alternative:

- ○ Plot the terms in the sum, for k=1 to k=50.

- ○ The code does not work because we can only plot arrays, not lists.

- ○ Plot the terms in the sum, for k=1 to k=51.

- ○ Plot the sum as a function of n, for n=1 to n=50.

- ○ Plot the difference between the sum and pi, for n=1 to 50.

Maximum marks: 1

24 Hvilket utsagn er riktig?

Look at the following two loops. Which of the statemens below is correct?

```
Clist = []
F = 0
while F < 40:
    Clist.append((F-32)*5.0/9)
    F += 5

Clist = []
for F in range(0,40,5):
    Clist.append((F-32)*5.0/9)
```

Select one alternative:

- ○ The two loops are equivalent (produce the same list Clist)

- ○ The while loop stops at F=35, and the for loop stops at F=40

- ○ The list produced by the while loop is longer than that of the for loop

- ○ The for loop is wrong and will give an error message

- ○ The while loop is wrong and will give an error message

Maximum marks: 1

25 Hva skrives ut?

The file 'temperature.dat' looks as follows:
```
yyyy  mm  tmax    tmin
          degC    degC
 1853  1   6.4     2.7
 1854  1   3.2    -1.8
 1855  1   7.7    -0.6
```

```
1856   1   2.6   -1.5
1857   1   6.8    2.1
```

What is printed by the following code?

```
infile = open('temperature.dat')
for i in range(2):
    infile.readline()
year = 0
tmax = -100
for line in infile:
    words = line.split()
    temp = float(words[2])
    if temp > tmax:
        tmax = temp
        year = int(words[0])

print(year, tmax)
```

Select one alternative:

- ○ 1855 1 7.7 -0.6

- ○ 1857 1 6.8 2.1

- ○ 1857 6.8

- ○ 1855 7.7

- ○ 1853 6.4

Maximum marks: 1