

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:

4

An error message

2

b = 4

b = 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:

7

4

An error message

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:

- 4 28
- 2 4
- 4 4
- An error message



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:

- An error message
- 0.5
- 0.0
- 1.0



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:

- An error message
- 4 8
- 2 4
- 4 4



Maximum marks: 1

6 Lister

Which of the following lines does **not** result in a list of length 6?

Select one alternative:

- a = list(range(6))
- a = [4,5]+[1,2,3,4]
- a = [0]*6
- a = [3*e for e in range(2)]



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:

- 4
- 3
- 9
- An error message
- 16



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:

- An error message
- 6
- 8
- 2*x+4



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:

- 2
- 6
- 0
- 4
- An error message



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:

- 0.75
- 1.25
- 1.0
- An error message
- 0.0



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
- An error message
- 40 110
- 100
- 35 110
- 45 120



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:

- Luke Skywalker
- Skywalker
- An error message
- Minch
- Luke



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:

- Please provide two command line arguments
- The arguments must be numbers
- An error message
- Nothing
- 1.2342



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
- Success
- Nothing



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:

- 0 0 1 0 2 1 0
- 0 1 2 0 1 2
- 0 1 2 3 4
- 1 0 2 0 2 1



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. 1. 2. 3. 4. 5.]
- [0. 0.5 1. 1.5 2. 2.5]
- [0. 1. 2. 3. 4. 5. 6.]
- [0. 0.5 1. 1.5 2. 2.5 0. 0.5 1. 1.5 2. 2.5]



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:

- True
- False
- 6
- 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:

- 10
- False
- True
- 100
- 0



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 'list'> <class 'list'>
- <class 'list'> <class 'str'>
- <class 'str'> <class 'str'>
- <class 'str'><class 'list'>



Maximum marks: 1

20 Hvilket utsagn er riktig?

One of the following statements is correct. Which one?

Select one alternative:

- A test function should always take at least one argument.
- Vectorization means to avoid explicit for-loops in the code.
- A function must always include a return statement.
- A function can only have one return statement.



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(cos,pi/2)
- d = num_diff(cos(),pi/2,h=1e-6)
- d = num_diff(cos(pi/2))
- d = num_diff(cos(x),pi/2,1e-6)
- d = num_diff(sin(x),pi/2,1e-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
- A has length 9
- A has length 3
- Cannot convert ['0','0','0'] to int
- Cannot convert ['10','9','8'] to int



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

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 while loop is wrong and will give an error message
- 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

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:

1857 1 6.8 2.1

1855 1 7.7 -0.6

1857 6.8

1853 6.4

1855 7.7



Maximum marks: 1