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UNIVERSITY OF OSLO

Faculty of mathematics and natural sciences

Trial exam, fall 2018:

IN1900 — Introduction to programming with scientific applications

IN-KJM 1900 — Introduction to programming for chemists

MAT-IN1105 — Programming, Modelling and Computations

This is a test exam to help you prepare for the midterm exam in IN1900, IN-KJM1900 and MAT-IN1105. The purpose of the exam is to get familiar with the Inspera system and to see some examples of typical questions that are given on the actual exam. The real midterm exam will be more extensive (25 questions instead of 10), but both the topics and the types of questions will be similar. All questions are multiple choice questions. Most have only one valid answer, but some have multiple correct answers.

1 Test functions

Which of the following statements are correct?

Select one or more alternatives:

- ☐ Test functions should always contain a return statement

- ☐ The statement **assert False, 'Error'** stops the program ✔
  execution with an error message.

- ☐ If a test function runs silently (no error message), the functi ✔
  being tested is correct.

- ☐ Test functions should always have at least one argument

Maximum marks: 2

2 Functions

Suppose the following code is executed:

x = 2

```
y = 4

def f(x, y):
    z = x * y
    return z

result = f(x, x)
print(result)
```

What is printed out?

Select an alternative:

- 8
- 4   ✔
- 2
- 16

Maximum marks: 1

3   What is printed?

What is printed in the terminal window when the following code is run? The argument end = ' ' in the print statements is Python 3 syntax and replaces the usual line shift after a print statement with a space character.

```
for i in range(2, 5):
    print(i, end = ' ')
    for j in range(i-1, i+1):
        if  i != j:
            print(j, end = ' ')
```

Select an alternative:

- 2 1 2 1
- 2 2 1 1
- 2 1 3 2 4 3   ✔
- 1 2 2 3
- 2 1 3 2

Maximum marks: 1

4 What is printed?

What is printed when the following code is run?

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

Select an alternative:

○ 0

○ 2 ✔

○ 4

○ -2

Maximum marks: 1

5 What is printed?

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

```
import numpy as np

def fibonacci(N=3):
    x = np.zeros(N+1, int)
    x[0] = 1
    x[1] = 1
    for n in range(2, N+1):
        x[n] = x[n-1] + x[n-2]
    return n, x[n]

print(fibonacci(N=2))
```

Select an alternative:

○ (1,1,2,3)

○ [0,1,1,2]

○ [0,1,1,2,3]

○ (2,2)   ✔

Maximum marks: 1

6 What is correct?

One of the following statements is correct. Which one?

Select an alternative:

○ The call numpy.sin(2) will give an error message, since 2 is not an array.

○ Numpy arrays can only be used for storing numbers.

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

○ Adding two Numpy arrays of length n will result in an array of length 2n.

Maximum marks: 1

7 Lists

Which of the following expressions does **not** result in a list of length 5?

Select an alternative:

○ [0]*5

○ [2,3]+[0,2,3]

○ [e**2 for e in range(1,5)]   ✔

○ list(range(2))+list(range(3))

Maximum marks: 1

8   What is printed?

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

```
import numpy as np
a = np.linspace(0, 5, 1)
a.append(6.0)
print(a)
```

Select an alternative:

○ An error message   ✔

○ [0. 1. 2. 3. 4. 5. 6.]

○ [6. 0. 1. 2. 3. 4. 5.]

○ [0. 1. 2. 3. 4. 5.]

Maximum marks: 1

9   What is printed?

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

```
dna_list = ['GGTAG', 'GGTAC', 'GGTGC']
print(dna_list[len(dna_list)])
```

Select an alternative:

○ An error message   ✔

○ ['GGTAG', 'GGTAC', 'GGTGC']

○ GGTGC

○ 'C'

Maximum marks: 1

10   Functions

The following function estimates the derivative of a function f, passed as an argument to the function. The derivative is estimated in a point x, which is also passed as an argument. We want to use the function to evaluate the
derivative of sin(x) in x=pi. Which function call is correct?

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

Select one alternative:

○ d = num_diff(sin,pi)   ✔

○ None of them.

○ d = num_diff(sin(x),pi,1e-6)

○ d = num_diff(sin(),pi,h=1e-6)

○ d = num_diff(sin(pi))

Maximum marks: 1