COMP-102 Midterm
Oct 23, 2013 10:05-11:25.
O P E N • B O O K S •/• O P E N • N O T E S

[10%] **1)** **a)** How many double layer Blu-Ray disc can be stored on a 2TB hard drive ?

[7%] **b)** What is the binary representation of the integer 541 ?

[7%] **c)** What number in base 10 has (32 bits) floating point representation

1 10101010 10000000000000000000000 ?

2) Consider the following algorithm :

```
input x_n x_{n-1} ... x_0, y_n y_{n-1} ... y_0

for i:=0 to n do
  if x_i > y_i then z_i := x_i else z_i := y_i

output z_n z_{n-1} ... z_0
```

[7%] a) Explain in your own words what this algorithm does ?

[7%] b) Argue that if $x_n x_{n-1} \ldots x_0 = y_n y_{n-1} \ldots y_0$ then $z_n z_{n-1} \ldots z_0 = x_n x_{n-1} \ldots x_0$.

[12%] c) Simulate this algorithm with inputs $x_1=4, x_0=3, y_1=3, y_0=5$.

3) a) Consider the following algorithm for finding maximum similar to the one finding minimum seen in class :

```
Procedure FindMax(x_1 x_2 ... x_n)

maxi:=1; max:=x_1

for i:=2 to n do

  if x_i > max then max:=x_i; maxi:=i

output maxi
```

[20%] Rewrite this **Procedure** to make it recursive instead of iterative.

b) Remember the algorithm for sorting seen in class :

input $x_1x_2x_3 \ldots x_n$

for i:=1 **to** n-1 **do**

  j:=i-1+**FindMin**($x_ix_{i+1} \ldots x_n$)

  temp:=x_i; x_i:=x_j; x_j:=temp

output $x_1x_2x_3 \ldots x_n$

[20%] Rewrite this algorithm using **FindMax** instead of **FindMin**.

4) Remember the following JAVAscript pieces of code seen in class :

```
for (var current = 20; ; current++) {
  if (current % 7 == 0)
    break;
}
print(current);
```

[5%] What will be the output generated by this piece of code ? Explain.

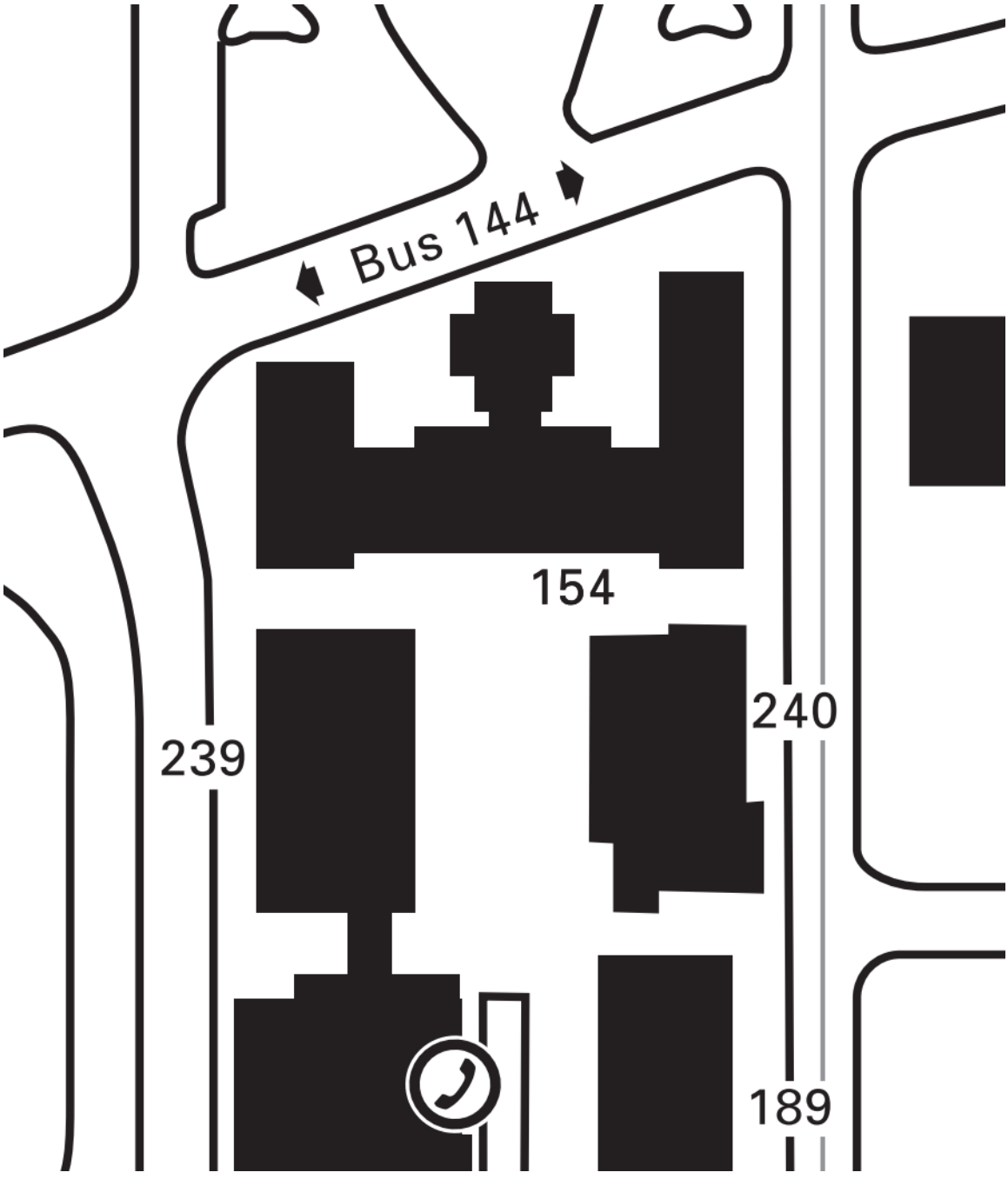
```
function add(number, howmuch) {
  if (arguments.length < 2)
    howmuch = 1;
  return number + howmuch;
}

show(add(6));
show(add(6, 4));
```

[5%] What will be the output generated by this piece of code ? Explain.

COMP102

MID TERM EXAM in room SADB 1/12



building 154 = SADB building 240 = ENGTR

```
Procedure FindMax(x1x2...xn)

maxi:=1; max:=x1

for i:=2 to n do

  if xi>max then max:=xi; maxi:=i

output maxi
```

```
Function FindMax(x1x2...xn)

if n=1 then return 1
else
    maxi:= FindMax(x1x2...xn-1)
    if xn>xmaxi then return n else return maxi
```

```
input x1x2x3 ... xn

for i:=1 to n-1 do

  j:=i-1+FindMin(xixi+1 ... xn)

  temp:=xi; xi:=xj; xj:=temp

output x1x2x3 ... xn
```

```
input x1x2x3 ... xn

for i:=n downto 1 do

  j:=FindMax(x1x2 ... xi)

  temp:=xi; xi:=xj; xj:=temp

output x1x2x3 ... xn
```