KUTAISI
INTERNATIONAL
UNIVERSITY

Exercise/TTF
for Basic Principles of Operating Systems 2023
Wolfgang J. Paul & Markus Neuhauser

Exercises for week 4

1. Consider the following program:

```
typedef bool* pbt;

int b;
int main()
{
pbt pbn;
b = 4;
pbn = new bool*;
pbn* = true;
if pbn* {b = b - 1} else {b = b + 1};
return 0
}
```

   (a) Specify the type table and function table.   (6 credit points)
   (b) Specify the initial configuration c^0.   (6 credit points)
   (c) Specify the computation (c^i) of the program. Specify only those components of c^i which change.   (25 credit points)

2. Recall that $2147483647 = 2^{31} - 1$.

   (a) For a boolean global variable x draw the derivation trees for

   $$x = 0 <= 2147483647 + 1$$

   and
   $$x = 0 <= 2147483647u + 1u.$$

   (6 credit points)

   (b) Determine the values

   $$va(2147483647 + 1, c) \text{ and } va(2147483647u + 1u, c).$$

   (6 credit points)

   (c) What is the value $va(x, c')$ of x after the assignments?
   (6 credit points)

3. (a) For a boolean global variable x draw the derivation trees for

$$x = 0 == 2147483648 * 2$$

and
$$x = 0 == 2147483648u * 2u.$$

(6 credit points)

(b) Determine the values

$$va(2147483648 * 2, c) \text{ and } va(2147483648u * 2u, c).$$

(6 credit points)

(c) What is the value $va(x, c')$ of x after the assignments?

(6 credit points)

4. Consider the following declarations:

```
typedef struct {int z, int y} b;
typedef b[2] x;
x a;
int z;
```

Compute the base addresses $ba\,(a, c)$ and $ba\,(z, c)$. Note that base addresses in global memory do not depend on c. (25 credit points)