a) CST

E^{t_3}
- $E + E^{t_2}$
- $id(a)$
- $-$ E^{t_1}
- $(E)^{t_1}$
- $E + E$
- $id(b)$ $id(c)$

b)

```
Load a
Load b
Load C
ADD
NEG
ADD
```

0-A-Code / Bytecode

c) DAG/AST

$+$
- a
- $minus$
  - $+$
    - b C
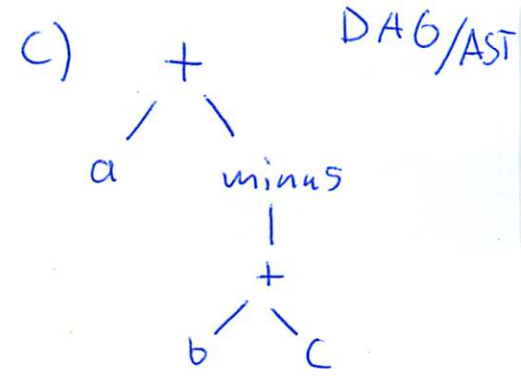
d)

$t_1 = b + c$
$t_2 = minus\ t_1$
$t_3 = a + t_2$

3A-Code

e) (ADD, b, C) 0
~~$(NEG, \$0)$~~
$(Minus\ \$0)$ 1
$(ADD\ a\ \$1)$ 2

Tripel

f)

op	arg1	arg2	result
0	$+$	b	c	t_1
1	minus	t_1		t_2
2	$+$	a	t_2	t_3

Quadrupel

---

a) AST

$+^{t_8}$
- $-^{t_4}$
  - $+^{t_0}$
    - x y
  - $*^{t_3}$
    - $+^{t_1}$
      - x y
    - $-^{t_2}$
      - x y
- $*^{t_7}$
  - $+^{t_5}$
    - x y
  - $-^{t_6}$
    - x y

b)
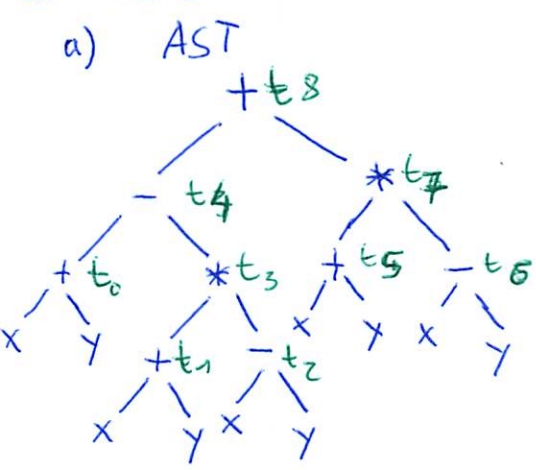
```
Load x
Load y
ADD
Load x
Load y
ADD
Load x
Load y
SUB
MUL
SUB
```

```
Load x
Load y
ADD
Load x
Load y
ADD
SUB
MUL
ADD
```
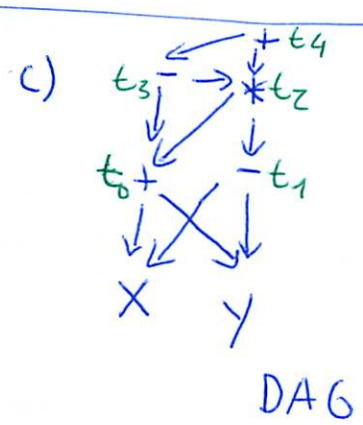
c) DAG

$+^{t_4}$
$*^{t_2}$
$t_3 -$
$t_0 +$
$-^{t_1}$
x y

DAG

d)

Für AST	Für DAG
$t_0 = x+y$	$t_0 = x+y$
$t_1 = x+y$	$t_1 = x-y$
$t_2 = x-y$	$t_2 = t_0 * t_1$
$t_3 = t_1 * t_2$	$t_3 = t_0 - t_2$
$t_4 = t_0 - t_3$	$t_4 = t_3 + t_2$
$t_5 = x+y$	
$t_6 = x-y$	
$t_7 = t_5 * t_6$	
$t_8 = t_4 + t_7$	

e)

ADD x,y	0
SUB x,y	1
Mul $0, $1	2
SUB $0, $2	3
ADD $3, $2	4

Tripel

		arg1	arg2	
0	$+$	x	y	t_0
1	$-$	x	y	t_1
2	$*$	t_0	t_1	t_2
3	$-$	t_0	t_2	t_3
4	$+$	t_3	t_2	t_4

Quadrupel