EECS2030 Advanced Object-Oriented Programming (Fall 2021)

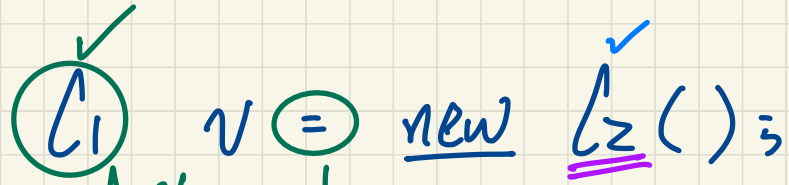
Q&A - Lecture 6, 7a

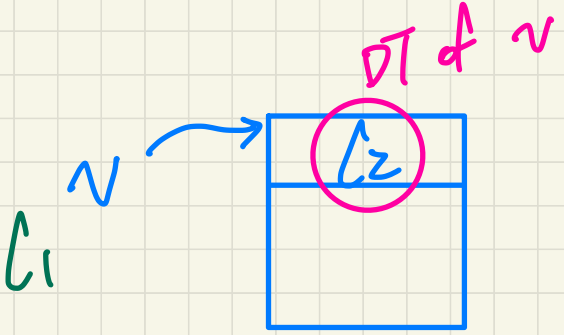
Thursday, November 25

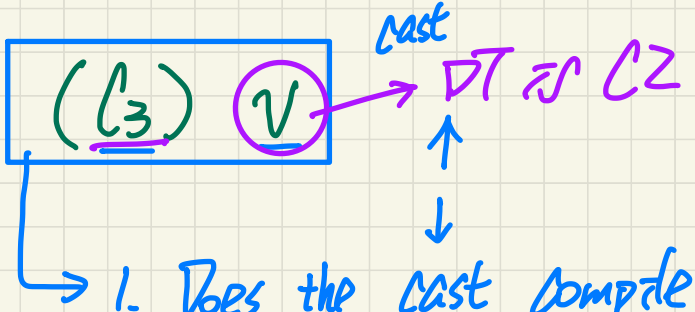
Announcement

1. 1 hour (Generics in Java)
2. Prog. Exercise (Wide).
   ↳ general book vs. generic book
3. ArrayList vs. Hashtable :

- Lecture W11 (released: Nov. 23)
- Lab5 due Monday, December 6
- Written Test 3
- Programming Test 3
  ↳ Lab 4 solution → Monday Nov 29.







2. Given that the cast compiles, there will be a ClassCastException if DT of v (C2) cannot fulfill the cast type C3.

Upward Casting

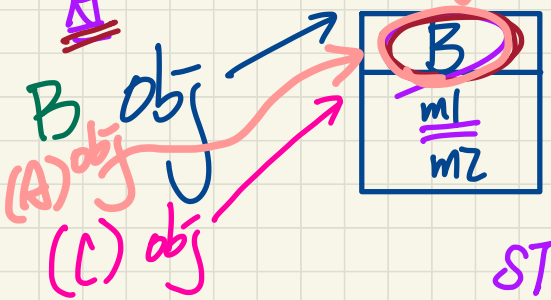
((A) obj)

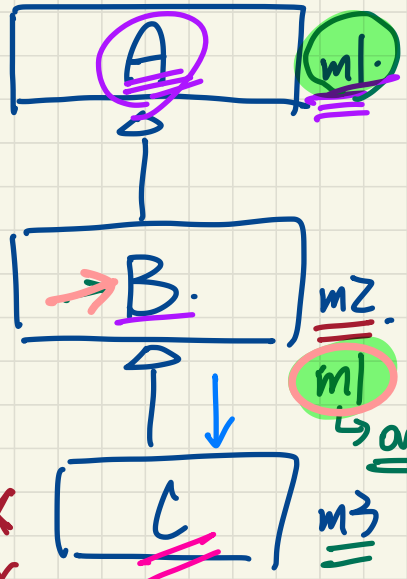
↳ ((A) obj). m1

① ((A) obj). m1

- m2 ✗
- m3 ✗

expression with ST A





ST DT

B obj = new B();

Downward Cast

(C) obj

↳ if this was valid

⇒ we can invoke what's expected on C or the cast object

e.g. ((C) obj). m3

↳ crash ⇒ at runtime invalid

② Dynamic Binding

((A) obj). m1.

ST: A

Which version of m1 invoked? in B

Written Test 3 Example Questions

Consider the following classes, where we use **print** to abbreviate **System.out.println**:

```
class A extends B {
  A() { }
}
```

```
class B extends C {
  B() { }
}
```

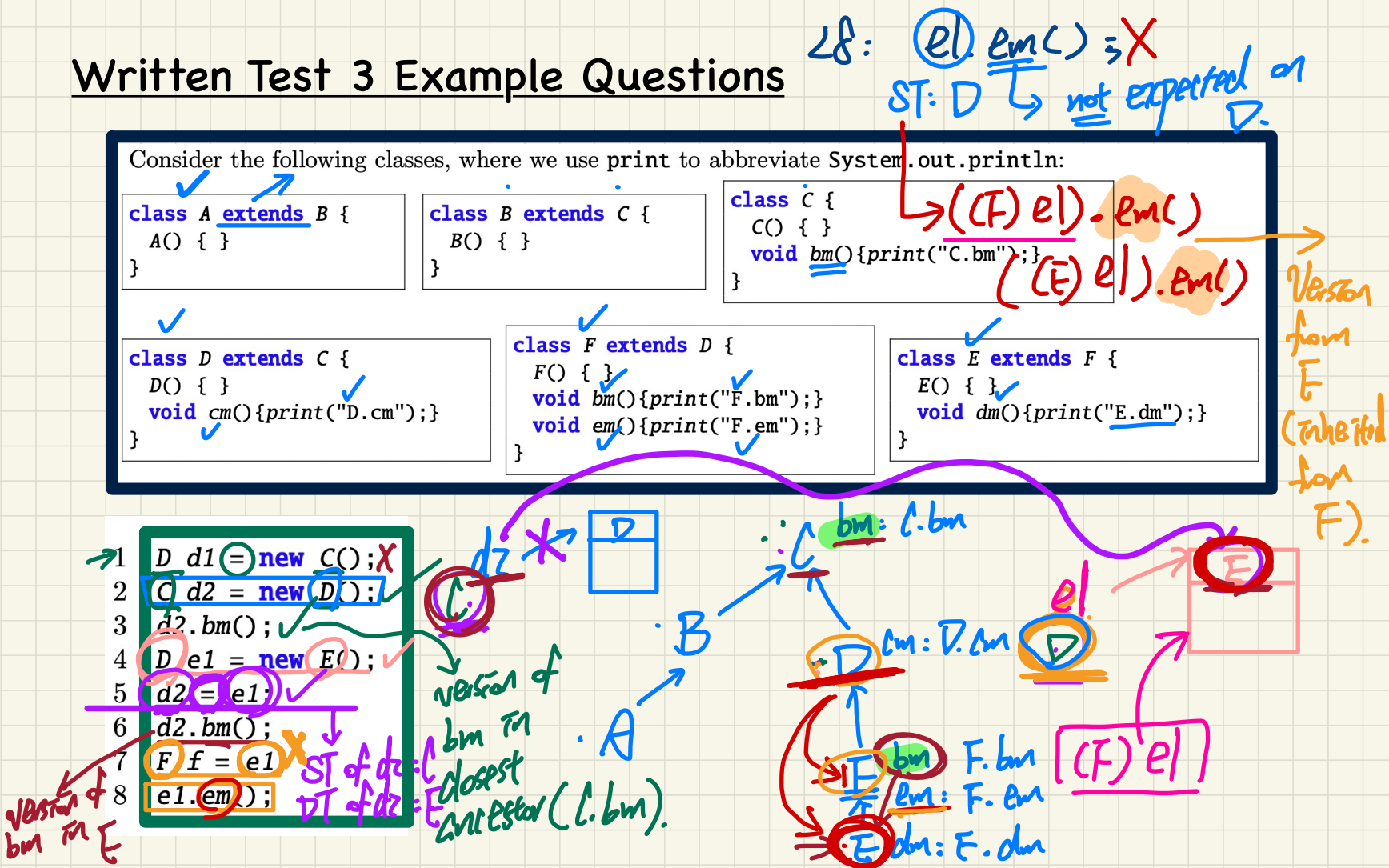
```
class C {
  C() { }
  void bm(){print("C.bm");}
}
```

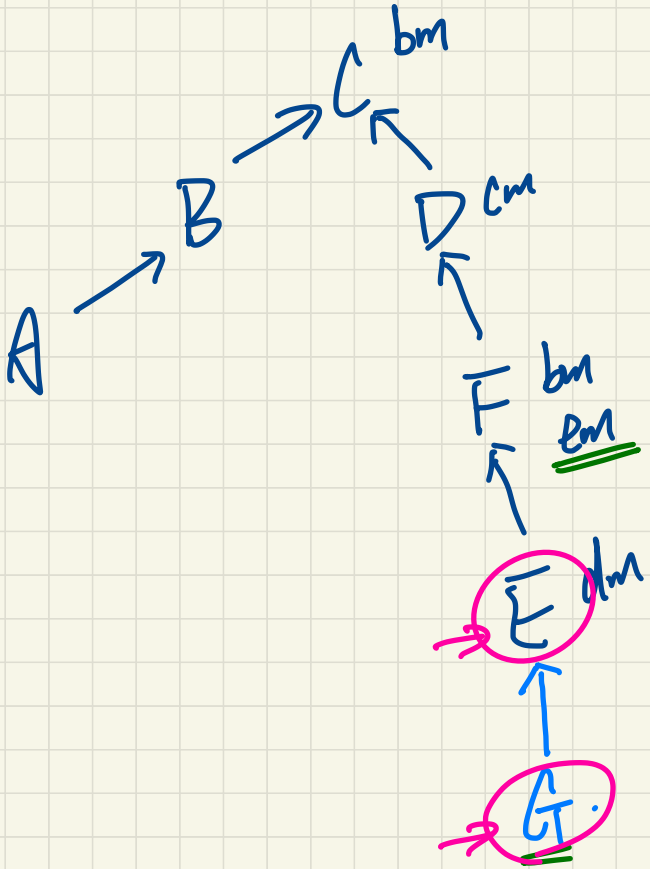
```
class D extends C {
  D() { }
  void cm(){print("D.cm");}
}
```

```
class F extends D {
  F() { }
  void bm(){print("F.bm");}
  void em(){print("F.em");}
}
```

```
class E extends F {
  E() { }
  void dm(){print("E.dm");}
}
```

```
1  D d1 = new C();
2  C d2 = new D();
3  d2.bm();
4  D e1 = new E();
5  d2 = e1;
6  d2.bm();
7  F f = e1;
8  e1.em();
```





el → E

D el = new E() ;

el.em() X

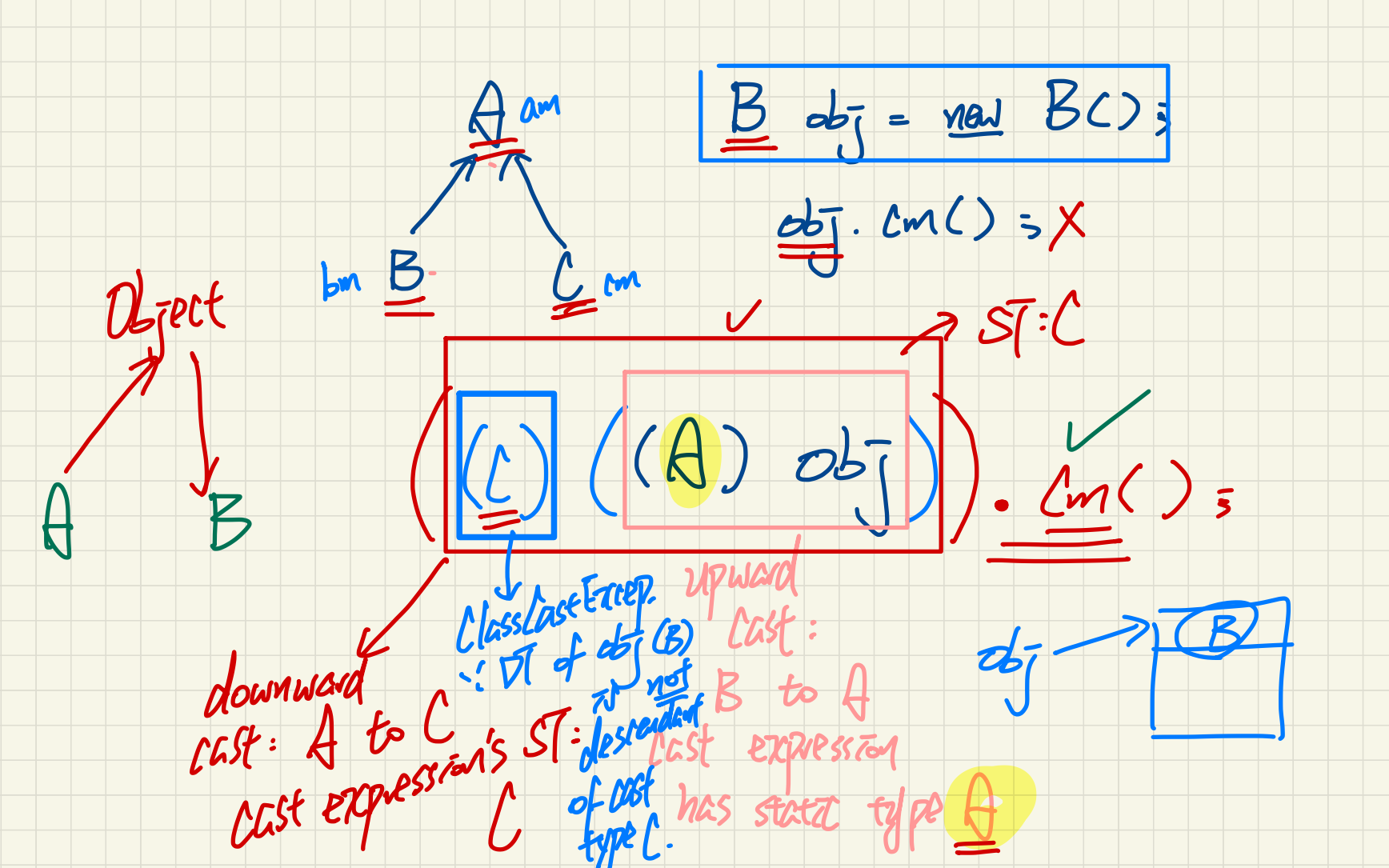
((G) el).em() ST: G

1. Compile? ✓

2. exception?

↳ Yes. CCE

↳ DT of el (E) ⇒ not descendant of G


A am
bm B
C cm
B obj = new B();
obj.cm() = X
Object
A
B
ST:C
(C)
((A) obj).cm();
downward cast: A to C
cast expression's ST: C
ClassCastExcep. :: DT of obj (B) not descendant of cast type C.
upward cast: B to A
cast expression has static type A
obj
B

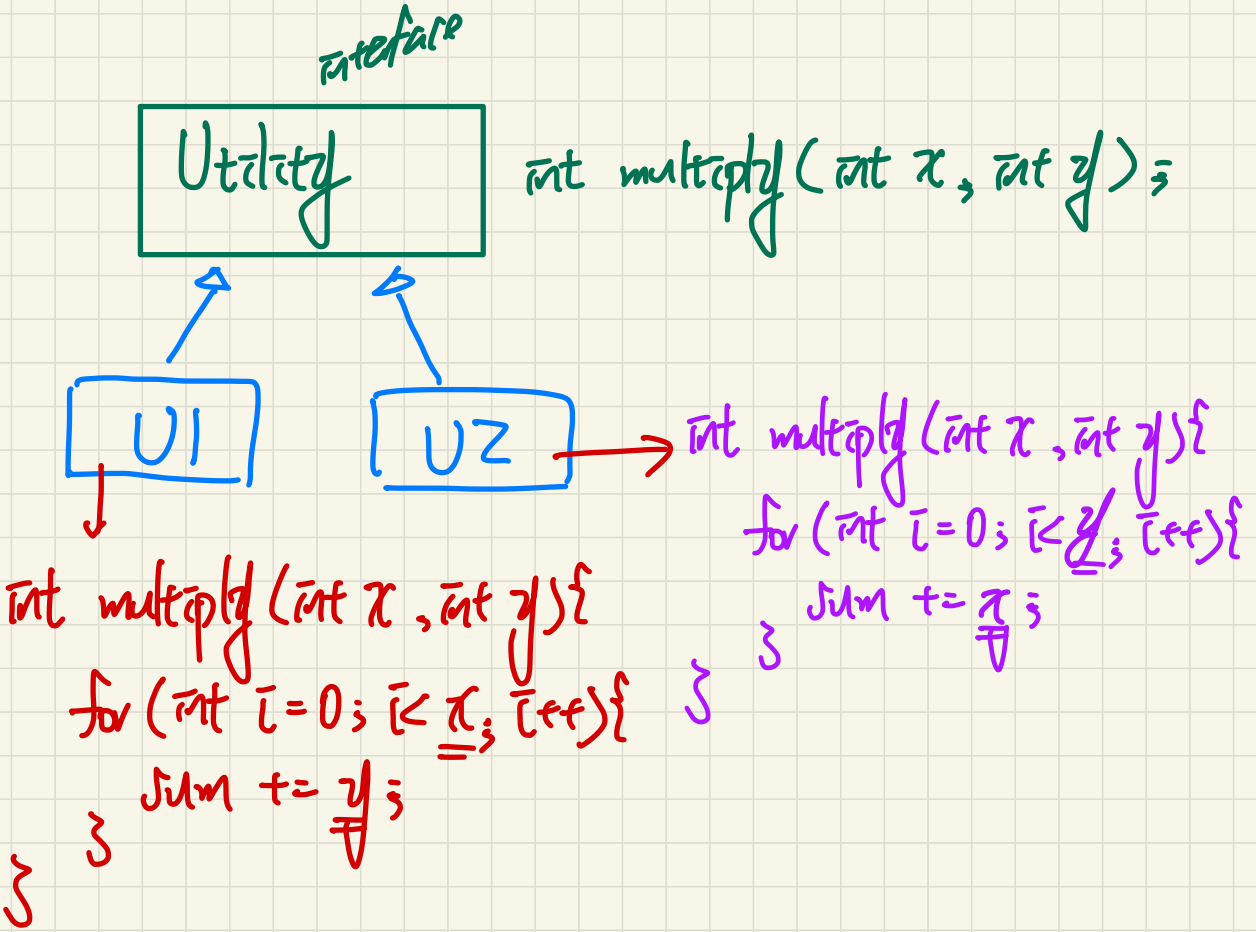
1. Code can be executed ⇒

Code compiles

2. → Code runs into ClassCastException

⇒ Code can be executed

⇒ Code compiles


interface
Utility
int multiply(int x, int y);
U1
U2
int multiply(int x, int y){
for(int i=0; i<x; i++){
sum += y;
}
}
int multiply(int x, int y){
for(int i=0; i<y; i++){
sum += x;
}
}