**AP Computer Science**

**ICE19: Casting and instanceof**

**Thursday, 4 November 2010**

The exercises refer to the following classes:

public class Employee { … }

public class Teacher extends Employee { … }

public class Doctor extends Employee { … }

public class CompSciTeacher extends Teacher { … }

Each class is equipped with a default constructor (one that doesn't take any parameters).

For each labeled line below, does that line compile? If not, would it compile if there were a cast? If it does compile (or would with a cast), would it throw an exception? (Consider all the lines as belonging to one method, executing in order from top to bottom. If a line would not compile or would throw an exception, pretend that the program skips that line.)

Employee emp;

Teacher teach;

Doctor doc;

CompSciTeacher cst;

1. emp = new Employee();
2. emp = new Teacher();
3. emp = new CompSciTeacher();
4. teach = new CompSciTeacher();
5. teach = new Doctor();
6. teach = new Employee();
7. cst = new CompSciTeacher();
8. cst = new Teacher();
9. cst = new Employee();
10. doc = new Doctor();
11. doc = new CompSciTeacher();
12. doc = new Employee();

emp = new Teacher();

1. teach = emp;

teach = new Teacher();

1. emp = teach;
2. cst = teach;

cst = new CompSciTeacher();

1. teach = cst;
2. emp = cst;
3. teach = emp;
4. cst = emp;
5. doc = emp;

For each labeled chunk below, state whether the instanceof would yield true or false. All of these lines compile and run without error.

Employee emp = new Employee();

Teacher teach = new Teacher();

Doctor doc = new Doctor();

CompSciTeacher cst = new CompSciTeacher();

1. emp instanceof Employee
2. teach instanceof Employee
3. doc instanceof Employee
4. cst instanceof Employee
5. emp instanceof Teacher
6. teach instanceof Teacher
7. doc instanceof Teacher
8. cst instanceof Teacher
9. emp instanceof CompSciTeacher
10. teach instanceof CompSciTeacher
11. doc instanceof CompSciTeacher
12. cst instanceof CompSciTeacher

emp = new Teacher();

1. emp instanceof Employee
2. emp instanceof Teacher
3. emp instanceof CompSciTeacher

emp = new CompSciTeacher();

1. emp instanceof Employee
2. emp instanceof Teacher
3. emp instanceof CompSciTeacher

teach = new CompSciTeacher();

1. teach instanceof Employee
2. teach instanceof Teacher
3. teach instanceof CompSciTeacher