Activity: Solidity Contracts and Inheritance

These set of activities require remix at http://remix.ethereum.org/

1. Compile, run and deploy this contracts. Deploy both contracts in the Javascript Environment. This environment does not require a testnet and Metamask.

```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >=0.7.0 <0.9.0;
contract Compute {
   uint public data;
   uint public info;

   constructor(uint c) {
      info = c;
   }

   //public function
   function setData(uint a) public { data = a; }
   function compute(uint a, uint b) internal pure returns (uint)
{ return a + b; }
}

//Derived Contract
contract DCompute is Compute(13) {
   uint private result;

   function getComputedResult() public {
      result = compute(3, 5);
   }
   function getResult() public view returns(uint) { return result; }
   function getinfo()  public view returns(uint) { return info; }
}
```

2. Determine the values returned (indicated by ?) when the following sequence are run

Compute	setData (key in a value here)
Compute	data?
Compute	info?
DCompute	getComputedResult
DCompute	getResult?
DCompute	setData (key in a value here)
DCompute	getData?
DCompute	getinfo?
DCompute	info?

Do the answers conform to your understanding?

Play around with the code, modify them so that you can understand the results better.

3. Compile, run and deploy this contracts. Deploy both contracts in the Javascript Environment. This environment does not require a testnet and Metamask. Fix whatever error or warnings.

```
contract Compute {
   uint private data;
   uint public info;

   constructor() {
      info = 10;
   }

   //public function
   function setData(uint a) public { data = a; }
   function getData() virtual public view returns(uint) { return
data; }
   function compute(uint a, uint b) internal pure returns (uint)
{ return a + b; }
}

//Derived Contract
contract DCompute is Compute {
   uint private result;

   constructor() {

   }
   function getComputedResult() public {
      result = compute(3, 5);
   }
   function getResult() public view returns(uint) { return result; }
   function getinfo()  public view returns(uint) { return info; }
}
```

4. Determine the values returned (indicated by ?) when the following sequence are run

DCompute	getComputedResult
DCompute	getResult?
DCompute	setData (key in a value here)
DCompute	getData?
DCompute	getinfo?
DCompute	info?

Do the answers conform to your understanding?

5. Compile, run and deploy this contracts. Deploy both contracts in the Javascript Environment. This environment does not require a testnet and Metamask.

```
contract Compute {
   uint public data;
   uint public info;

   constructor() {
      info = 10;
   }
   //private function
   function increment(uint a) private pure returns(uint) { return
a + 1; }

   //public function
   function setData(uint a) public { data = a; }
   function getData() virtual public view returns(uint) { return
data; }
   function compute(uint a, uint b) internal pure returns (uint)
{ return a + b; }
}

//Derived Contract
contract DCompute is Compute {
   uint private result;

   constructor() {

   }
   function getComputedResult() public {
      result = compute(3, 5);
   }
   function getResult() public view returns(uint) { return
result; }
   function getinfo()  public view returns(uint) { return info; }

}
```

6. What are the results?

DCompute getComputedResult
DCompute getResult?
DCompute setData (key in a value here)
DCompute data?
DCompute getData?
DCompute getinfo?
DCompute info?

Compute getData?
Compute data?
Compute setData (key in a value here)
Compute getData?
Compute data?
Do the answers conform to your understanding?

7. Why is the function increment not available? How can the function increment be used? Write a function that called getIncrementedResult() that uses the function increment() so that the function returns an value incremented by 1.

8. Compile, run and deploy this contracts. Deploy both contracts in the Javascript Environment. This environment does not require a testnet and Metamask

```
contract Compute {
   uint private data;
   uint public info;

   constructor() {
      info = 10;
   }
   //private function
   function increment(uint a) private pure returns(uint) { return
a + 1; }

   //public function
   function setData(uint a) public { data = a; }
   function getData()public view returns(uint) { return data; }
   function compute(uint a, uint b) public pure returns (uint)
{ return a + b; }
}

//Derived Contract
contract DCompute is Compute {
   uint private result;
   Compute private c;
   constructor() {
      c = new Compute();
   }
   function getComputedResult() public {
      result = compute(3, 5);
   }
   function getResult() public view returns(uint) { return
result; }
   function getCompute(uint a, uint b) public view  returns(uint)
{
            uint d=c.compute(a, b);
            return d;
}
function setCompute(uint a, uint b) public  {
            info=c.compute(a, b);
}

function setInfo(uint a) public { info = a; }
function getInfo()public view returns(uint) { return info; }

}
```

9. Determine the values returned (indicated by ?) when the following sequence are run

DCompute	getComputedResult
DCompute	getResult? (Why isn't there a result button?)
DCompute	setData (key in a value here)
DCompute	getData?
Compute	setData (key in a value here)
Compute	getData? (any difference)
DCompute	getData?
DCompute	getCompute?
DCompute	setCompute
DCompute	getInfo?
DCompute	setInfo (key in a value here)
DCompute	getInfo?
Compute	info?

10. Fix the errors and warnings in the program below so that it can be deployed without any warnings or errors.

```
contract Compute {
   uint private data;
   uint public info;

   constructor() {
      info = 10;
   }
   //private function
   function increment(uint a) private pure returns(uint) { return a
+ 1; }

   //public function
   function setData(uint a) public { data = a; }
   function getData()public view returns(uint) { return data; }
   function compute(uint a, uint b) internal pure returns (uint)
{ return a + b; }
}

//Derived Contract
contract DCompute is Compute {
   uint private result;
   Compute private c;
   constructor() {
      c = new Compute();
   }
   function getComputedResult() public {
      result = compute(3, 5);
   }
   function getResult() public view returns(uint) { return result; }
   function getData()public view returns(uint) { return c.info(); }
}
```

11. Deploy both contracts in the Javascript Environment. This environment does not require a testnet and Metamask.
12. Determine the values returned (indicated by ?) when the following sequence are run

Compute setData = 44
Compute getData?
Compute info?

DCompute setData = 4
DCompute getData?
DCompute getResult?
DCompute info?

Do the answers conform to your understanding?

13. Fix and run the following contracts.

```
// SPDX-License-Identifier: GPL-3.0
pragma solidity >=0.7.0 <0.9.0;
contract C {
  uint public u;
  function f() public {
    u = 1;
  }
}

contract B is C {
  function f() public {
    u = 2;
  }
}

contract A is B {
  function f() public {
    u = 3;
  }
  function f1() public {
    super.f();
  }
  function f2() public {
    B.f();
  }
  function f3() public{
    C.f();
  }
}
```

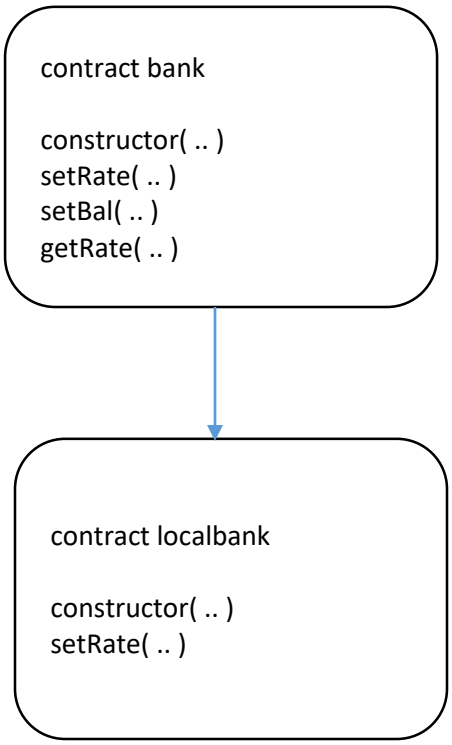
14. What is the value of variable u after every function in A is run. Explain why the values are such.

15. Write 2 contracts named bank and localbank -- localbank is the child of the bank contract.
    The bank contract has state variables name, balance and rate. The name variable is of type ‘string’, the rest is uint.

    The bank contract has a constructor with parameters that will initialize the ‘name’ and ‘balance’. The constructor will also set the rate fixed to be 1.

    In addition the bank contract has member functions:
    a. setRate that takes in a uint parameter that assigns a new rate
    b. setBal that takes in a uint parameter that assigns a new balance
    c. getRate that returns the value of the current rate variable

    The localbank is a child contract of bank. It has a function called setRate that increments what ever the parent bank rate is by 2.



    Question:
    Check that the name, balance and rate are correctly initialized in bank and localbank
    Check the value of rate in bank
    Now call setRate in localbank
    Check the value of rate in localbank and bank, are they the same? Explain.