

1. Given the following class definitions, what would be printed on screen?

```

Java

class Animal {
    public void print() {
        System.out.print("Animal ");
        sound();
    }

    public void sound() {
        System.out.print("A ");
    }
}

class Mammal extends Animal {
    public void print() {
        System.out.print("Mammal ");
        super.print();
    }

    public void sound() {
        System.out.print("M ");
    }
}

class Cat extends Mammal {
    public void print() {
        System.out.print("Cat ");
        sound();
    }
}

class Dog extends Mammal {
    public void sound() {
        System.out.print("Hav ");
    }
}

public class Zoo {
    public static void main(String[] args)
    {
        Cat cat = new Cat();
        Dog dog = new Dog();
        Mammal ma1 = new Cat();
        Mammal ma2 = new Dog();
        Mammal ma3 = new Mammal();

        cat.print(); System.out.println();
        dog.print(); System.out.println();
        ma1.print(); System.out.println();
        ma2.print(); System.out.println();
        ma3.print(); System.out.println();
    }
}

```

```

C++

#include <iostream>
using namespace std;

class Animal {
public:
    virtual void print() {
        cout << "Animal ";
        sound();
    }

    virtual void sound() {
        cout << "A ";
    }
};

class Mammal : public Animal {
public:
    virtual void print() {
        cout << "Mammal ";
        Animal::print();
    }

    virtual void sound() {
        cout << "M ";
    }
};

class Cat : public Mammal {
public:
    virtual void print() {
        cout << "Cat ";
        sound();
    }
};

class Dog : public Mammal {
public:
    virtual void sound() {
        cout << "Hav ";
    }
};

int main() {
    Cat *cat = new Cat();
    Dog *dog = new Dog();
    Mammal *ma1 = new Cat();
    Mammal *ma2 = new Dog();
    Mammal *ma3 = new Mammal();

    cat->print(); cout << "\n";
    dog->print(); cout << "\n";
    ma1->print(); cout << "\n";
    ma2->print(); cout << "\n";
    ma3->print(); cout << "\n";
    return 0;
}

```

2. What if we had static binding instead of dynamic binding? That is, what would the output be if the methods were all non-virtual?
3. What would the output be if `print()` were virtual but `sound()` were not?
4. What would the output be if `print()` were non-virtual but `sound()` were virtual?