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CSE 2221 Homework 10

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1. We Implement the swapNN method using copyFrom (and not transferFrom):

```
/**
 * Swaps the two given {@code NaturalNumber}s.
 *
 * @param n1
 *            the first {@code NaturalNumber}
 * @param n2
 *            the second {@code NaturalNumber}
 * @updates n1
 * @updates n2
 * @ensures n1 = #n2 and n2 = #n1
 */
private static void swapNN(NaturalNumber n1, NaturalNumber n2) {
    NaturalNumber n3 = new NaturalNumber2();
    n3.copyFrom(n1);
    n1.copyFrom(n2);
    n2.copyFrom(n3);
}
```

2. We Implement the swapNN method using transferFrom:

```
/**
 * Swaps the two given {@code NaturalNumber}s.
 *
 * @param n1
 *            the first {@code NaturalNumber}
 * @param n2
 *            the second {@code NaturalNumber}
 * @updates n1
 * @updates n2
 * @ensures n1 = #n2 and n2 = #n1
 */
private static void swapNN(NaturalNumber n1, NaturalNumber n2) {
    NaturalNumber n3 = new NaturalNumber2();
    n3.transferFrom(n1);
    n1.transferFrom(n2);
    n2.transferFrom(n3);
}
```

2. We Implement a method to square a natural number:

```
/**
 * Squares a given {@code NaturalNumber}.
 *
 * @param n
 *            the number to square
 * @updates n
 * @ensures n = #n * #n
 */
private static void square(NaturalNumber n) {
    NaturalNumber n1 = new NaturalNumber2();
    n1.copyFrom(n);
    n.multiply(n1);
}
```

Additional Questions

1. It is not possible to swap two integer arguments using an arbitrary method. The formal parameters within the method are only defined locally, and thus swapping inside the method does not change the values of the primitives within the main.

2. It is not possible to swap two immutable type arguments using an arbitrary method as a direct consequence of their immutability.