1. Write a simple application that reverses the elements in an array of integers. You can declare your array to be any size and initialize it with any values, but your code should work for any array of integers. Print the reversed array to the console. Hint: think about swapping elements in the array.

2. Write an applet that reads a single integer from a text field and displays an integer whose digits are the reverse of the original in another text field (when an appropriate button is pressed). For example, if the input where 1234, the result should be 4321.

Note: this problem is very different from the previous one! You do not need to use an array at all for this one.

Your applet must contain a method

```java
private int reverse(int number)
```

that performs the actual reversal. This method will be called from your `actionPerformed` method. You will need to use the `/` and `%` operators to accomplish the reversing process. Refer back to your calculator if you forget how to convert between numbers and Strings.

3. A shift cypher is a cryptographic method in which each letter in a message (called the plaintext) is “shifted” right by some number (call this number $k$) of places. (Lauren talked about a shift cypher at the beginning of her talk on cryptography.) If a letter is shifted “off the end” of the alphabet, it wraps back around to the beginning. For example, to encode the message

`you are way cool`

using $k = 4$, you would perform the following transformation:

| y | ⇒ | c |
| w | ⇒ | a |
| a | ⇒ | e |
| l | ⇒ | p |
| e | ⇒ | i |
| r | ⇒ | v |
| u | ⇒ | y |
| o | ⇒ | s |
| c | ⇒ | g |
| s | ⇒ | p |

So the encrypted message (called the cyphertext), with spaces removed, is

`csyeviaecgssp`
Write an applet that accepts an encrypted message and a shift amount in text fields, and writes the decrypted message to another text field when a “Decrypt” button is pressed.

Your applet must contain a method

    private String decrypt(String cypherText, int k)

that decrypts the message. (This method will be called from your actionPerformed method.)

You may assume that the encrypted message contains only lower case letters. The decrypted message should also only contain lower case letters.

You will need to think carefully about how you will take each letter from cypherText and decrypt it. Use a char array (instead of a String) to hold your decrypted message while it is being processed. Then convert it to a String for the return value. Hint: you will need to use type casting (p. 181) in the conversion process. When you typecast a char to an int, it is converted to its corresponding integer value in Unicode (p. 166). The Unicode system assigns the lower case letters contiguous integer values.

Refer back to your calculator if you forget how to convert the String taken from a text field into a number.

Here are some test cyphertexts you can use to test your applet:

    ndjgpeeatildgzh  k = 15
    lwvbgwctwdmxzwoziuuqvo  k = 8
    fnahfqdc  k = 25

Be sure to include appropriate comments in your code and to test your programs completely before handing them in.

Start early (or now) and have fun!