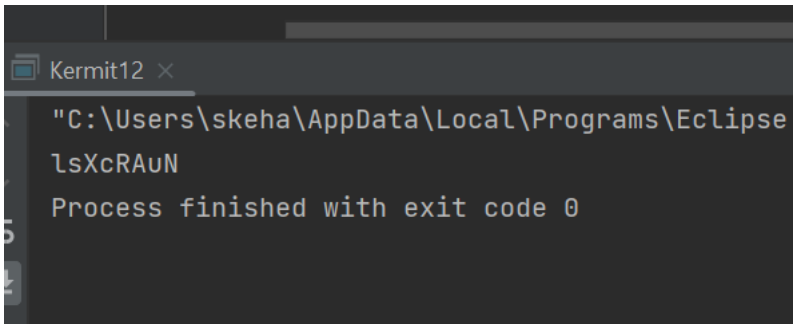
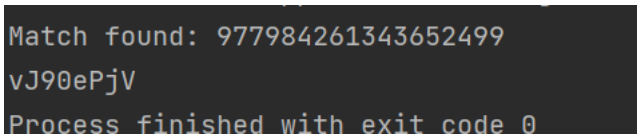
Next-Generation Technologies Assignment3- Rainbow Tables

Output for part 1:



Output 2:



Code solution:

Problem 1: we create an for loop to loop through 10000 times to find the end value for Kermit12

Problem 2: we create a for loop to loop through the array 10 times in order to find the hash values for the start values by checking each res value to see if they match.

```
/*  CT255 Assignment 2
 *  This class provides functionality to build rainbow tables (with a
different reduction function per round) for 8 character long strings, which
    consist of the symbols "a .. z", "A .. Z", "0 .. 9", "!" and "#" (64
symbols in total).
    Properly used, it creates the following value pairs (start value - end
value) after 10,000 iterations of hashFunction() and reductionFunction():
          start value  -  end value
          Kermit12        lsXcRAuN
          Modulus!        L2rEsY8h
          Pigtail1        R0NoLf0w
          GalwayNo        9PZjwF5c
          Trumpets        !oeHRZpK
          HelloPat        dkMPG7!U
          pinky##!        eDx58HRq
          01!19!56        vJ90ePjV
          aaaaaaaa        rLtVvpQS
          036abgH#        klQ6IeQJ


 *
 * @author Michael Schukat
 * @version 1.0
 */
public class RainbowTable {
```

```java
    /**
     * Constructor, not needed for this assignment
     */
    public RainbowTable() {

    }

    public static void main(String[] args) {
        long res = 0;
        int i;
        String start;

        if (args != null && args.length > 0) { // Check for <input> value
            start = args[0];

            if (start.length() != 8) {
                System.out.println("Input " + start + " must be 8
characters long - Exit");
            }
            else { // part 1

                for (int k = 0; k < 10; k++) { // for loop to loop through
the array
                    start = args[k];

                    for (i = 0; i < 10000; i++) { // iterate 10000 times
                        res = hashFunction(start); // call hash function
                        start = reductionFunction(res, i); // calling
reduction hash function

                        // part 2

                        if (res == 895210601874431214L) { // finding if
hash values match to the start values
                            System.out.printf("Match found: %d\n", res);
                        }
                        if (res == 750105908431234638L) {
                            System.out.printf("Match found: %d\n", res);
                        }
                        if (res == 111111111115664932L) {
                            System.out.printf("Match found: %d\n", res);
                        }
                        if (res == 977984261343652499L) {
                            System.out.printf("Match found: %d\n", res);
                        }
                    }
                    }
                    System.out.printf("%s", start);
                }

            }
        else{ // No <input>
                System.out.println("Use: RainbowTable <Input>");
            }

    }

    private static long hashFunction(String s){
        long ret = 0;
        int i;
        long[] hashA = new long[]{1, 1, 1, 1};
```

```
        String filler, sIn;

        int DIV = 65536;

        filler = new
String("ABCDEFGHABCDEFGHABCDEFGHABCDEFGHABCDEFGHABCDEFGHABCDEFGHABCDEFGH");

        sIn = s + filler; // Add characters, now have "<input>HABCDEF..."
        sIn = sIn.substring(0, 64); // // Limit string to first 64
characters

        for (i = 0; i < sIn.length(); i++) {
            char byPos = sIn.charAt(i); // get i'th character
            hashA[0] += (byPos * 17111); // Note: A += B means A = A + B
            hashA[1] += (hashA[0] + byPos * 31349);
            hashA[2] += (hashA[1] - byPos * 101302);
            hashA[3] += (byPos * 79001);
        }

        ret = (hashA[0] + hashA[2]) + (hashA[1] * hashA[3]);
        if (ret < 0) ret *= -1;
        return ret;
    }

    private static String reductionFunction(long val, int round) {  // Note
that for the first function call "round" has to be 0,
        String car, out;                                            // and
has to be incremented by one with every subsequent call.
        int i;                                                      // I.e.
"round" created variations of the reduction function.
        char dat;

        car = new
String("0123456789ABCDEFGHIJKLMNOPQRSTUNVXYZabcdefghijklmnopqrstuvwxyz!#");
        out = new String("");

        for (i = 0; i < 8; i++) {
            val -= round;
            dat = (char) (val % 63);
            val = val / 83;
            out = out + car.charAt(dat);
        }

        return out;
    }
}
```