Cryptography Homework on RSA

Suppose a RSA public key is:

```
n = 125953175678398351570149977764211035679420156938429586850000579961775054888014711050952194404928504160243324417202380464659083542772305519159214463831847643286738542961736012
1

e = 65537
```

1. What is the cipher text if you encrypt your student ID number using the textbook RSA algorithm?

2. Explain why textbook RSA is not safe for encrypting student ID numbers. How can you improve the security of textbook RSA?

3. Suppose that you find the decryption key to be

   ```
   d = 879829162542850074748838973716462641470292321076843078870413133138541894315167534655428516005898396122103324293925057981802023330186106794090644952807381680714475934931163153
   ```

   Can you factor n? If so, what are the prime factors? Use a program to explain your approach.