Shift ciphers in Excel

Overview. You'll use Excel to encrypt and decrypt a short text using a shift cipher.

Things to do.

1. Encrypt a short text, as follows.
   (a) Start Excel, bring up a new worksheet, and set all the column widths to 2.
   (b) Concoct a message of about 25 letters, and enter it, one letter per cell, into the cells of Row 4 on your worksheet. Leave out all spaces and punctuation – type in nothing but *lower-case* letters.
   (c) Enter the formula `=code(A4)-97` into cell A3. (This takes the ASCII code of the character in cell A4 and subtracts 97, which happens to be the ASCII code for "a.")
   (d) Click on the grey "3" cell to highlight row 3, and type Ctrl-R to copy your formula into every cell in row 3. Row 3 should now contain the numeric equivalents of the letters in your message.
   (e) Now for the encryption. Choose a *numeric* key – that is, a number between 1 and 25 inclusive – and call it k. You want to add k to each number in row 3, and read the results modulo 26. To do this, enter the formula `=mod(A3+`k`,26)` into cell A2 (where k stands for your key number), and then copy it to each cell in Row 2. Check that the numbers in Row 2 make sense – they're the encrypted versions of the numbers in Row 3.
   (f) Now we'll convert the encrypted numbers back to text. Enter `=char(65+A3)` into cell A1, and copy it to every other cell in Row 1. (Any guesses as to what character has ASCII code 65?) The ciphertext appears in Row 1.
2. Now write down your ciphertext and numeric key on an index card and give it to someone else.
3. When you get a card from someone else, use Excel to decrypt it. You work out the details.