Conversion of Binary to BCD to ASCII

- A binary number can be converted to BCD format by using repeated division by 10.
- The largest 16-bit binary number is 65,535 which has five decimal digits.
- The first division by 10 generates the least significant digit (in the remainder).
- The ASCII code of a digit can be obtained by adding $30 to it.
- The ASCII code of 0 is "$30", the Ascii code of 1 is 31 and so on

Example: Write a program to convert the 16-bit number stored at $1000-$1001 to BCD format and store the result at $1010-$1014. Convert each BCD digit into its ASCII code and store it in one byte.

```
      org $1000
data  dc.w 12345      ;data to be tested
      org $1010
result   ds.b   5     ; reserve bytes to store the result
      org $1500
      ldd data        ;D = the number to be converted
      ldy #result     ;Y = the first address of result
      ldx #10         ;X =10
      idiv            ;D/X → X, R→D
      addb #$30       ;convert the digit into ASCII code
      stab 4,Y        ;save the least significant digit

      xgdx
       ldx #10
      idiv
       addb #$30
```

```
stab  3,Y ; save the second to least significant digit

xgdx
ldx   #10
idiv
addb  #$30
stab  2,Y ; save the middle digit

xgdx
ldx   #10
idiv
addb  #$30
stab  1,Y ; save the second most significant digit

xgdx
addb  #$30
stab  0,Y ; save the most significant digit
```

- If the number is less than 5 digits, we get zeros at left and do unnecessary operations for example: 345 will be 5, 4, 3, 0, 0, 0
- Two improvements: (1) loop can be used to reduce the program and (2) a condition to exit the loop when the quotient = 0