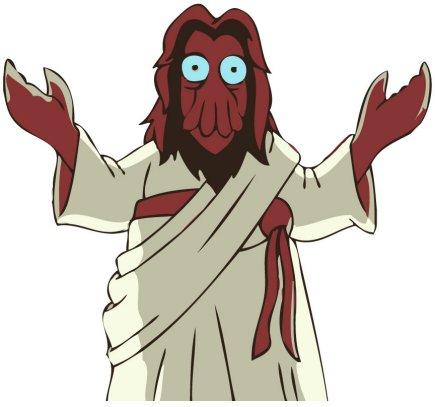
B2 - Synthesis Pool

B-SYN-200

palindrome

Iterated Turning Over Palindromes



2.0

palindrome

binary name: requirement.c, palindrome
language: C

- The totality of your source files, except all useless files (binary, temp files, obj files,...), must be included in your delivery.
- All the bonus files (including a potential specific Makefile) should be in a directory named *bonus*.
- Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

Requirement

Write a c file named **requirement.c** that contains the following two functions:
my_factrec_synthesis
Write a recursive function that returns the factorial of the number given as a parameter. It should be prototyped the following way:

```
int my_factrec_synthesis(int nb)
```

In case of error, the function should return 0.

my_squareroot_synthesis
Write a function that returns the square root (if it is a whole number) of the number given as argument.
If the square root is not a whole number, the function should return -1.
It should be prototyped the following way:

```
int my_squareroot_synthesis(int nb);
```

These functions must produce an answer in under 2 seconds.
Overflows must be handled (as errors).

Only malloc and free are allowed from libC.

The rest of the project will not be corrected unless this requirement is fully functional (and rewritten).

The file must be placed at the root of your git repository.
It will be compiled with our main function, and our Makefile (the -I flag being empty).

PALINDROME

A palindrome is a word or a number which reads the same backward or forward (that is for numbers, numbers invariant when reversed).
A *n*-iteration turnover palindrome is a number which leads to a palindrome after n iterations of the following procedure:

1. reverse the number,
2. add both the number and its reversal to obtain a new number,
3. iterate from the first step until you get a palindromic number.

For instance:
`121` is a 0-iteration turnover palindrome,
`123` is a 1-iteration turnover palindrome and
`4782` is a 3-iteration turnover palindrome.

The goal of this project is to find such iterated reversal palindromes, and the smallest number of iterations, in order to get a palindromic number, given the constraints on this number of iterations.

Terminal

```
~/B-SYN-200> ./palindrome -h
USAGE
      ./palindrome -n number -p palindrome [-b base] [-imin i] [-imax i]

DESCRIPTION
      -n n      integer to be transformed (>=0)
      -p pal    palindromic number to be obtained (incompatible with the -n
                option) (>=0)
                if defined, all fitting values of n will be output
      -b base   base in which the procedure will be executed (1<b<=10) [def: 10]
      -imin i   minimum number of iterations, included (>=0) [def: 0]
      -imax i   maximum number of iterations, included (>=0) [def: 100]
```

Your program output has to be strictly identical to the one below.

All the numbers are displayed in base 10.
If there is no solution, the message “no solution\n” is printed on the standard output, but is not considered as an error.

Terminal

```
~/B-SYN-200> ./palindrome -n 4782 -b 10
4782 leads to 46464 in 3 iteration(s) in base 10
```

Terminal

```
~/B-SYN-200> ./palindrome -n 64 -b 2
64 leads to 65 in 1 iteration(s) in base 2
```

Terminal

```
~/B-SYN-200> ./palindrome -n 4782 toto
invalid argument
```

Terminal

```
~/B-SYN-200> ./palindrome -p 363 -b 10
3 leads to 363 in 6 iteration(s) in base 10
6 leads to 363 in 5 iteration(s) in base 10
12 leads to 363 in 4 iteration(s) in base 10
15 leads to 363 in 3 iteration(s) in base 10
21 leads to 363 in 4 iteration(s) in base 10
24 leads to 363 in 3 iteration(s) in base 10
30 leads to 363 in 4 iteration(s) in base 10
33 leads to 363 in 3 iteration(s) in base 10
39 leads to 363 in 2 iteration(s) in base 10
42 leads to 363 in 3 iteration(s) in base 10
48 leads to 363 in 2 iteration(s) in base 10
51 leads to 363 in 3 iteration(s) in base 10
57 leads to 363 in 2 iteration(s) in base 10
60 leads to 363 in 3 iteration(s) in base 10
66 leads to 363 in 2 iteration(s) in base 10
75 leads to 363 in 2 iteration(s) in base 10
84 leads to 363 in 2 iteration(s) in base 10
93 leads to 363 in 2 iteration(s) in base 10
132 leads to 363 in 1 iteration(s) in base 10
231 leads to 363 in 1 iteration(s) in base 10
330 leads to 363 in 1 iteration(s) in base 10
363 leads to 363 in 0 iteration(s) in base 10
```

Terminal

```
~/B-SYN-200> ./palindrome -p 363 -b 10 -imax 2
39 leads to 363 in 2 iteration(s) in base 10
48 leads to 363 in 2 iteration(s) in base 10
57 leads to 363 in 2 iteration(s) in base 10
66 leads to 363 in 2 iteration(s) in base 10
75 leads to 363 in 2 iteration(s) in base 10
84 leads to 363 in 2 iteration(s) in base 10
93 leads to 363 in 2 iteration(s) in base 10
132 leads to 363 in 1 iteration(s) in base 10
231 leads to 363 in 1 iteration(s) in base 10
330 leads to 363 in 1 iteration(s) in base 10
363 leads to 363 in 0 iteration(s) in base 10
```

Terminal

```
~/B-SYN-200> ./palindrome -p 363 -b 10 -imin 6
3 leads to 363 in 6 iteration(s) in base 10
```

Terminal

```
~/B-SYN-200> ./palindrome -p 363 -b 10 -imin 7
no solution
```