```ocaml
 1: (* $Id: fibonacci.ml,v 342.1 2004-03-16 17:03:57-08 - - $ *)
 2: (*
 3: * Fibonacci function.
 4: * Done three ways:
 5: * - O(2^n), which is bad
 6: * - O(n), which is good
 7: * - mathematically, which is clever
 8: *)
 9:
10: let rec fib2n = function
11:     | 0 -> 0
12:     | 1 -> 1
13:     | n when n > 1 -> fib2n (n - 1) + fib2n (n - 2)
14:     | n              -> invalid_arg (string_of_int n)
15:     ;;
16:
17: let fib n =
18:     let rec fib' n a b =
19:         if n = 0 then a
20:                  else fib' (n - 1) b (a + b)
21:     in  if n < 0 then invalid_arg ("fib " ^ string_of_int n)
22:                  else fib' n 0 1
23:     ;;
24:
25: let fibmath n =
26:     let root5   = sqrt 5.            and
27:         floatn  = float n            in
28:     let phi     = (1. +. root5) /. 2. and
29:         psi     = (1. -. root5) /. 2.
30:     in  (phi ** floatn -. psi ** floatn) /. root5
31:     ;;
32:
```