

Foundations of Computer Science

ENGR 3520

Ben Fisher



Science of Computing



Proofs



(Proof by Construction)

Proofs

- Let $L = \{w \mid w \text{ is a palindrome}\}$



(Proof by Contradiction)

Accept State



- Can has accept state???

Reject State



- Dis is not accept state...



**PIT OF
DESPAIR!!!!**



Meta



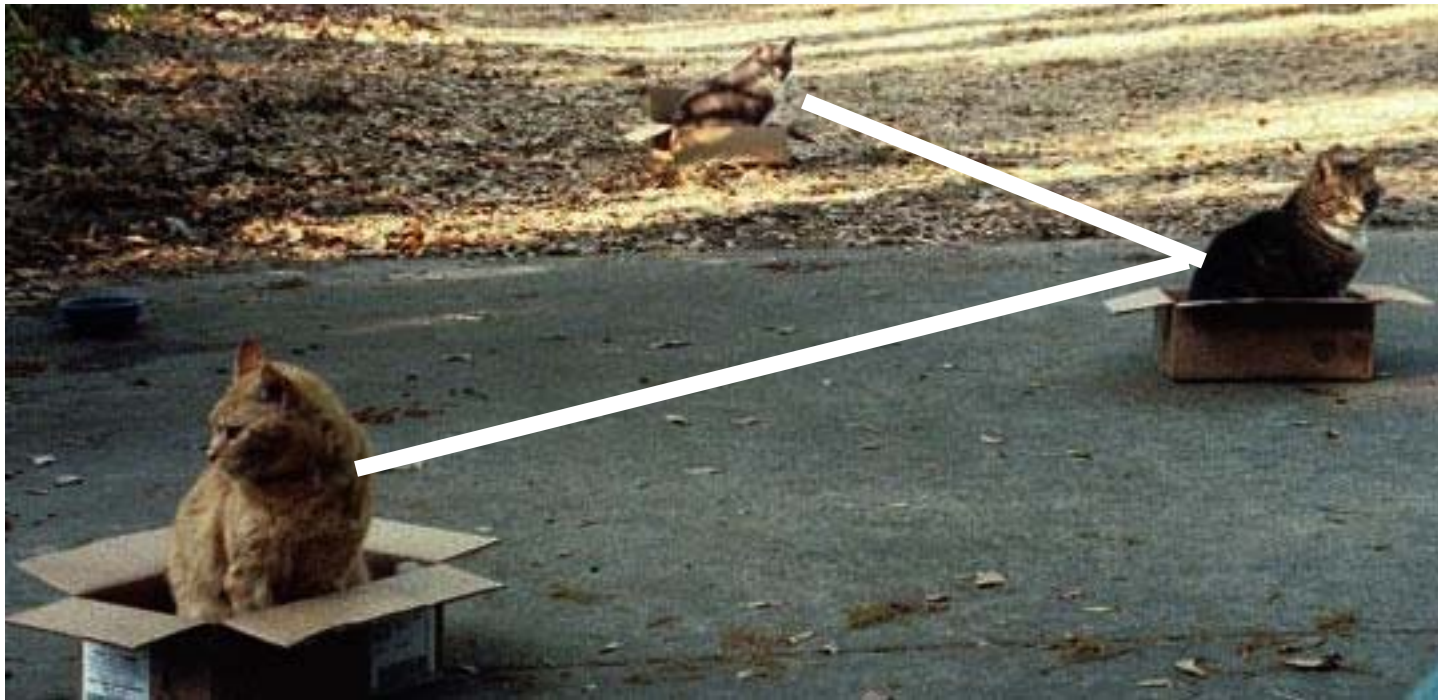
- Metacat is too meta for you.

Finite State

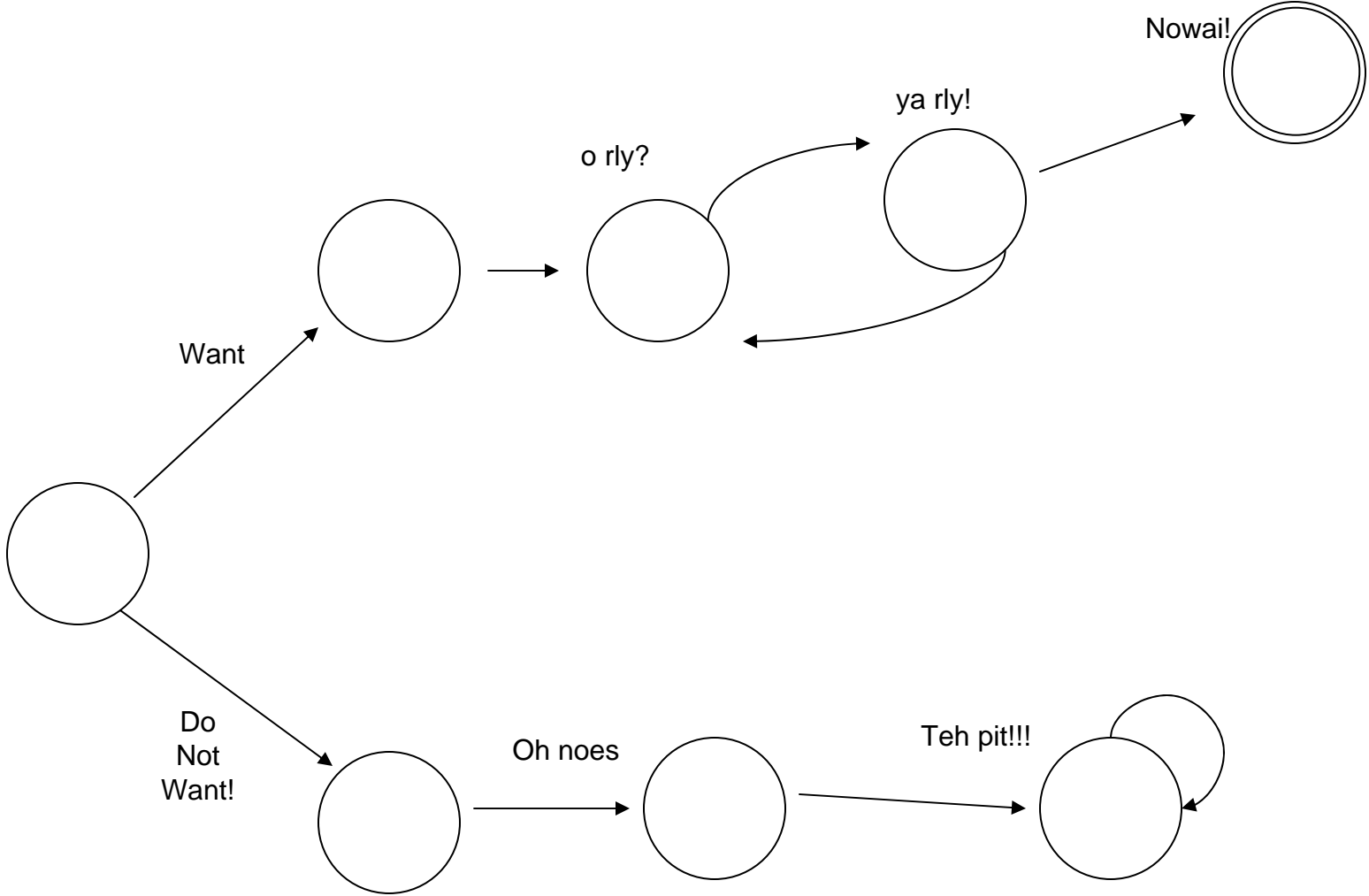


- Cannot count how many it has eaten.

Finite State Machine



DFA



NFA



- Non-deterministic cat: actually not an improvement.

PDA



- I has a bucket.

Scheme

- Code represented in symbolic expressions like $(x . y)$

S-Expression!!



OH HAI I FIXD UR CODE

```
(define (append a b)
  (if (null? a)
      (if (list? b)
          b
          (cons b '()))
      (cons
        (car a)
        (append
          (cdr a)
          b)
        )
      )
  )
)
```



Recursion



- Recursive cats are not amused.

Problem 2a

- Show that the language is closed under the star operation:



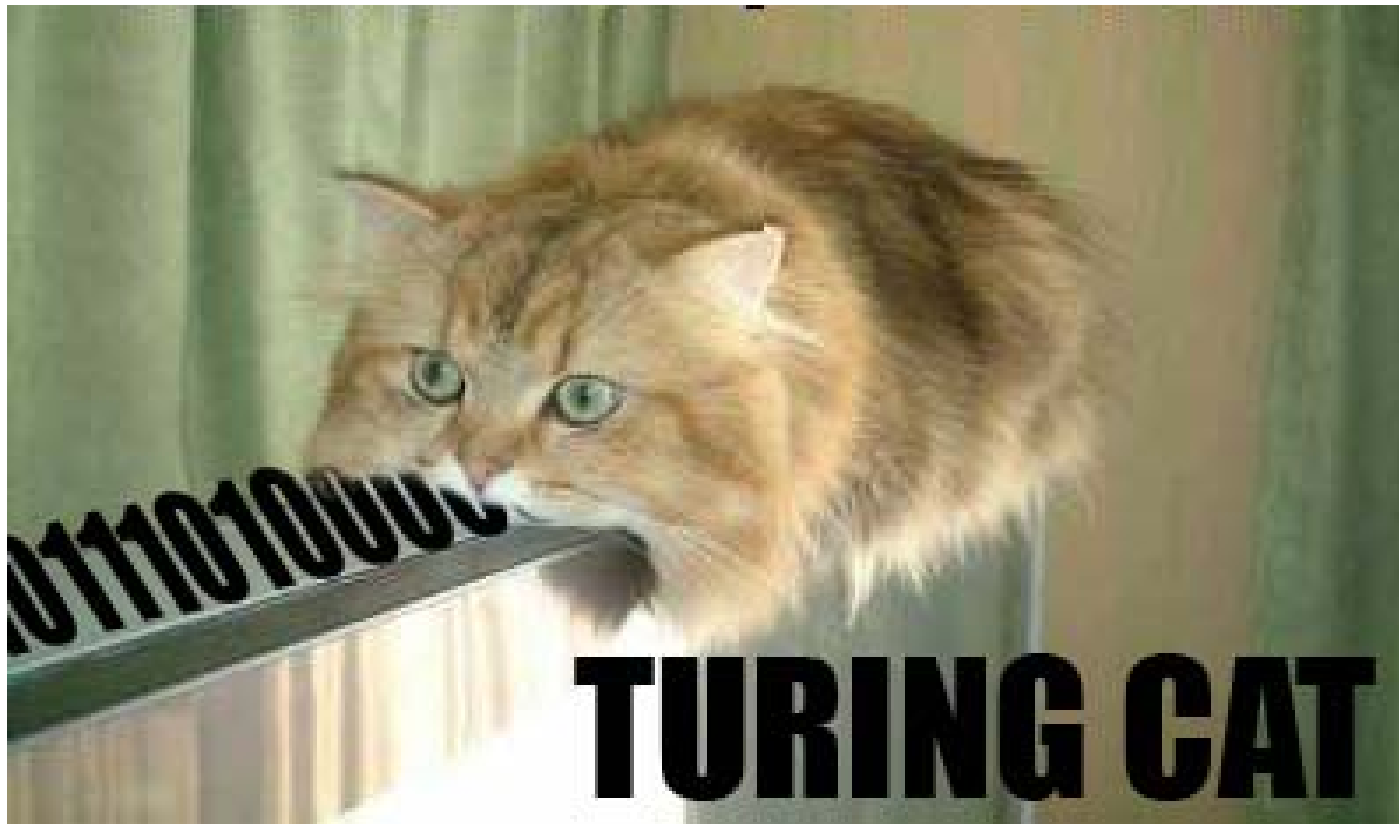
Problem 2b

- Show that the language is closed under concatenation:



Turing Machine

- An abstract symbol-manipulating device.

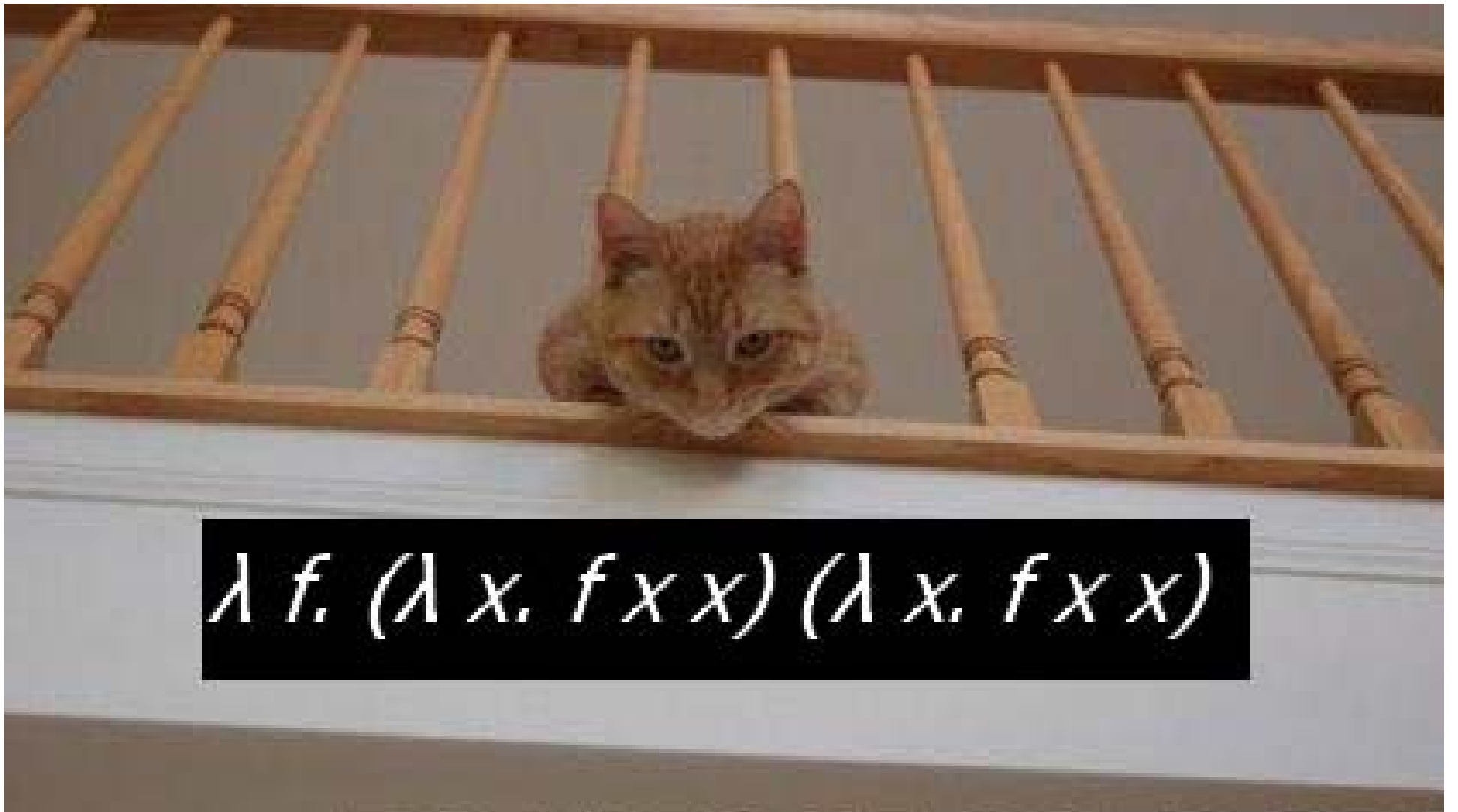


Alternate Turing Machines



The λ Calculus





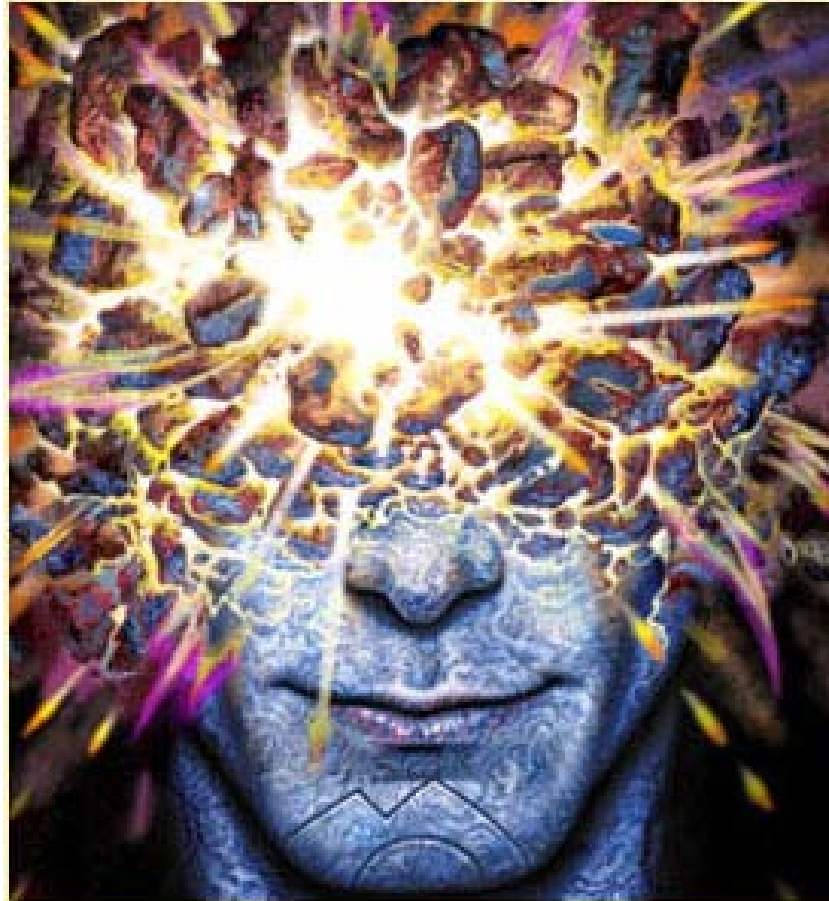
$\lambda f. (\lambda x. f x x) (\lambda x. f x x)$

Enlightenment



And then...

- Head explodes.





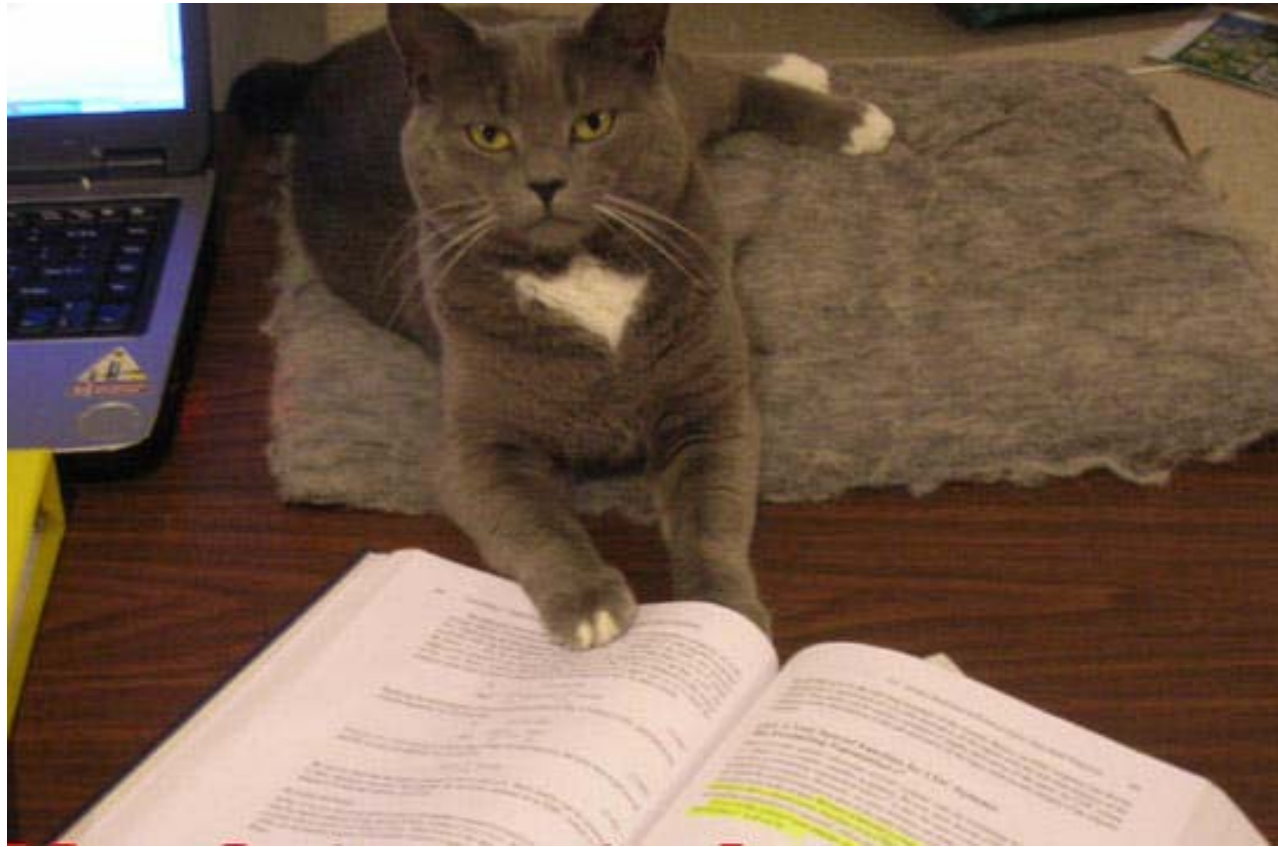
- I Know More Than You

Prolog



- More logical than you.

The End



- You Lose.