

# UC Berkeley's CS61A – Lecture 30 – Macros

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## Uber driver dropped off passenger at airport before returning to rob their home, police say

[www.sfgate.com/local/article/Uber-driver-dropped-off-passenger-at-airport-13751058.php](http://www.sfgate.com/local/article/Uber-driver-dropped-off-passenger-at-airport-13751058.php)

# UBER

[Uber driver 'tried to rob woman's home' after taking her to airport ...](#)

[fortune.com](#) › [Tech](#) › [Uber](#) ▼

Apr 1, 2015 - Police in Denver arrested an UberX **driver** Tuesday on suspicion of attempting to burgle a woman's **house** after he dropped her off at the airport.

[Uber driver accused of robbing passengers' homes after drop-off](#)

<https://nypost.com/.../uber-driver-accused-of-robbing-passengers-homes-after-drop-of...> ▼

Feb 17, 2017 - Police say an **Uber driver** in Delaware would drop off passengers at their destination and ... **Uber driver** accused of **robbing** passengers' **homes** after drop-off ... **Lyft** threatens Morgan Stanley with legal action over IPO claims ...

[CNN investigation: 103 Uber drivers accused of sexual assault or abuse](#)

<https://money.cnn.com/2018/04/30/technology/uber-driver-sexual.../index.html> ▼

Apr 30, 2018 - **After** an evening of cocktails in San Diego, a woman got into the back of an ... She says she then passed **out** in the backseat. When she regained consciousness, the **Uber** driver was on top of her, raping her, a block **from** her **home**, .... fell asleep intoxicated in the back of an **Uber** in **2016**, told CNN that she ...

“**A Rancho Cordova Uber driver is in custody after he allegedly dropped off a passenger at a local airport and then promptly attempted to rob their San Mateo home.** San Mateo police say the driver, Jackie Gordon Wilson, dropped off an unidentified passenger for a flight and then drove back to their house in San Mateo with the intention of burglarizing it. Police say Wilson's attempt was thwarted, however, when a Ring security camera caught him in action and an alarm system went off. However, another nearby resident wasn't so lucky. That homeowner also had a Ring security system which recorded the burglary, but when police arrived they said they found the home already "completely ransacked.” ”

# Programs as Data

## A Scheme Expression is a Scheme List

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Scheme programs consist of expressions, which can be:

- Primitive expressions: 2 3.3 true + quotient
- Combinations: (quotient 10 2) (not true)

The built-in Scheme list data structure (which is a linked list) can represent combinations

```
scm> (list 'quotient 10 2)
(quotient 10 2)
```

```
scm> (eval (list 'quotient 10 2))
5
```

In such a language, it is straightforward to write a program that writes a program

(Demo)

Macros

# Macros Perform Code Transformations

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A macro is an operation performed on the source code of a program before evaluation

Macros exist in many languages, but are easiest to define correctly in a language like Lisp

Scheme has a **define-macro** special form that defines a source code transformation

```
(define-macro (twice expr)
  (list 'begin expr expr))
```

> (twice (print 2))  
2  
2

► (begin (print 2) (print 2))

Evaluation procedure of a macro call expression:

- Evaluate the operator sub-expression, which evaluates to a macro
- Call the macro procedure on the operand expressions without evaluating them first
- Evaluate the expression returned from the macro procedure

(Demo)

For Macro

## Discussion Question

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Define a macro that evaluates an expression for each value in a sequence

```
(define (map fn vals)
  (if (null? vals)
      ()
      (cons (fn (car vals))
              (map fn (cdr vals))))))
```

```
scm> (map (lambda (x) (* x x)) '(2 3 4 5))
(4 9 16 25)
```

```
(define-macro (for sym vals expr)

  (list 'map _____
        (list 'lambda (list sym) expr) vals))
```

```
scm> (for x '(2 3 4 5) (* x x))
(4 9 16 25)
```

(Demo)

# Quasi-Quotation

(Demo)