Meeting 17: Functions

Announcements

- HW5 due next Friday 11/3 -- start now!
- Project Pre-Proposal due this Friday
- Midterm will be returned on Thursday
- HW4 COG re-opened until at Thursday 11:55pm
  - Note that COG points are not so significant.
  - Lots of folks working on improving HW4 after the deadline to get ready for the interviews and HW5.
  - But don’t ignore HW5. HW5 has started!
  - Do you have lessons learned about how to approach the homeworks from HW4?

Today

- Preview HW5 Functions
- Explicate from HW4?
- Your Questions

Questions

1. Flattening lambda and function
2. Closures (and closure conversion)
3. Subscripts (almost certainly)
4. Laying out assembly of functions
5. Preview HW 5
6. How functions affect liveness

```python
def main():
    x = 3
    f = f()  # return x
    return x

def f():
    x = 3
    y = 10
    f fv env = [x]
    f = [f code, f fv env]
    f env = f code
    return f env[0]

def f code(fv env):
    x = fv env[0]
```

```python
def f code(fv env):
    x = fv env[0]
```

```python
def g():
    a = 0
    return a + b
```

```
find free variables
used here and defined outside
```
P2 "growing the language"

1) closed functions (no free-fv)

2) add open functions (all free-fv) (clearer but only "immutable" vars can be assigned once)

3) adding mutable variables (cheaply)