Designing Programs

Design recipe

... but at the same time...

Helper functions and reuse

- Writing writing a function, consider whether existing functions help
- Look for functions that you wish you had written

Another Example

Write the function **bigger-image?** which checks whether one image has more pixels than a second image

```
; bigger-image? : image image -> bool
; Returns true if a has more pixels than b
(define (bigger-image? a b)
  (> (* (image-width a) (image-height a))
     (* (image-width b) (image-height b))))

(check-expect (bigger-image? ■ ■) true)
(check-expect (bigger-image? ■ ■) false)
```

Another Example

Write the function **`bigger-image?`** which checks whether one image has more pixels than a second image

```
; bigger-image? : image image -> bool
; Returns true if a has more pixels than b
(define (bigger-image? a b)
  (> (image-size a) (image-size b)))
```

```
(check-expect (bigger-image?  ) true)
(check-expect (bigger-image?  ) false)
```

Wish list: **`image-size`**

Fullfill wishes by applying the recipe again

(exercise for the reader)

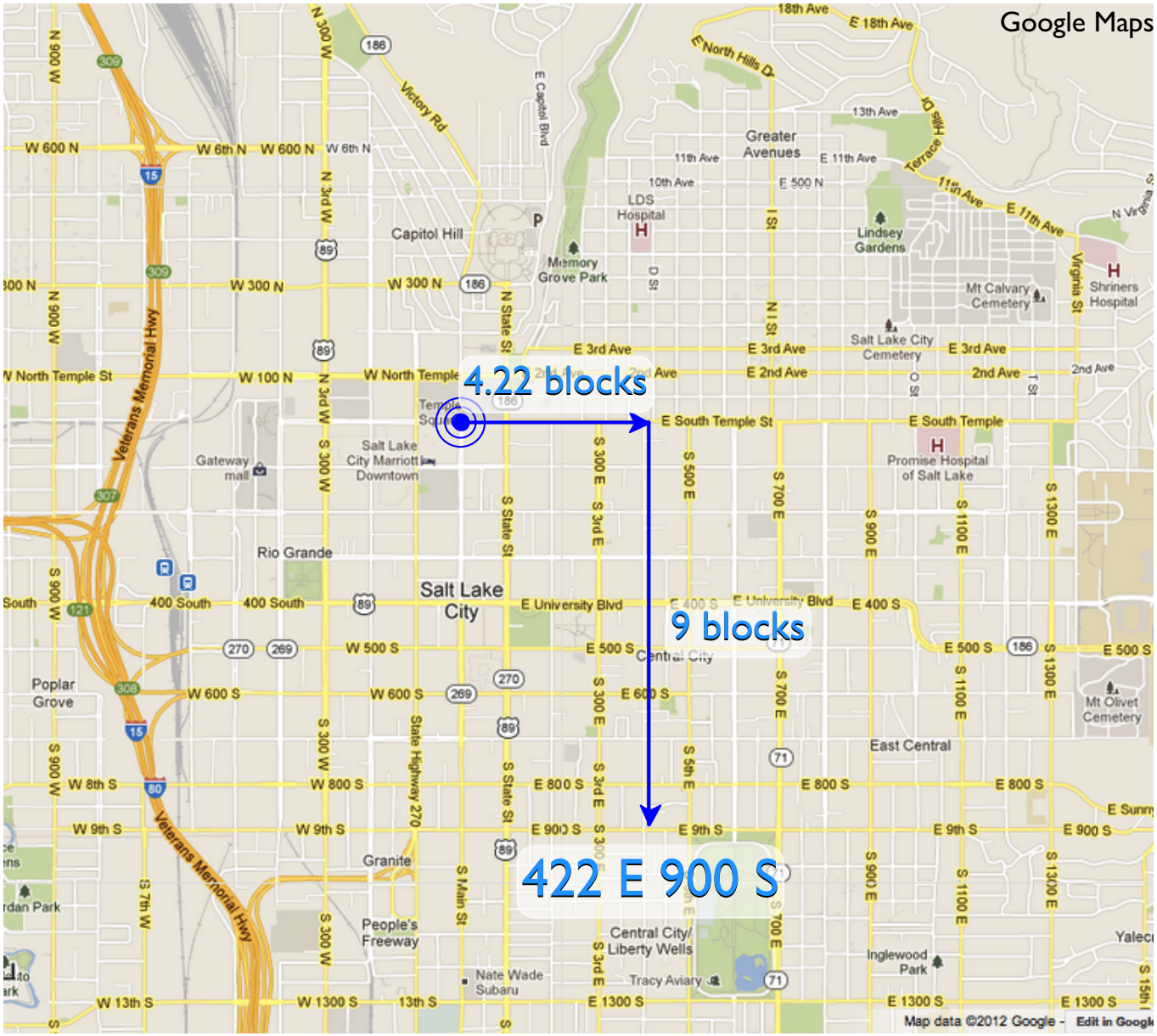
Reuse

We should be able to use **bigger-image?** to write the **max-image** function

```
; max-image : image image -> image
; Returns a if a has more pixels than b,
; otherwise returns b
(define (max-image a b)
  (cond
   [(bigger-image? a b) a]
   [else b]))

(check-expect (max-image ■ ■) ■)
(check-expect (max-image ■ ■) ■)
```

Example: Salt Lake City Addresses



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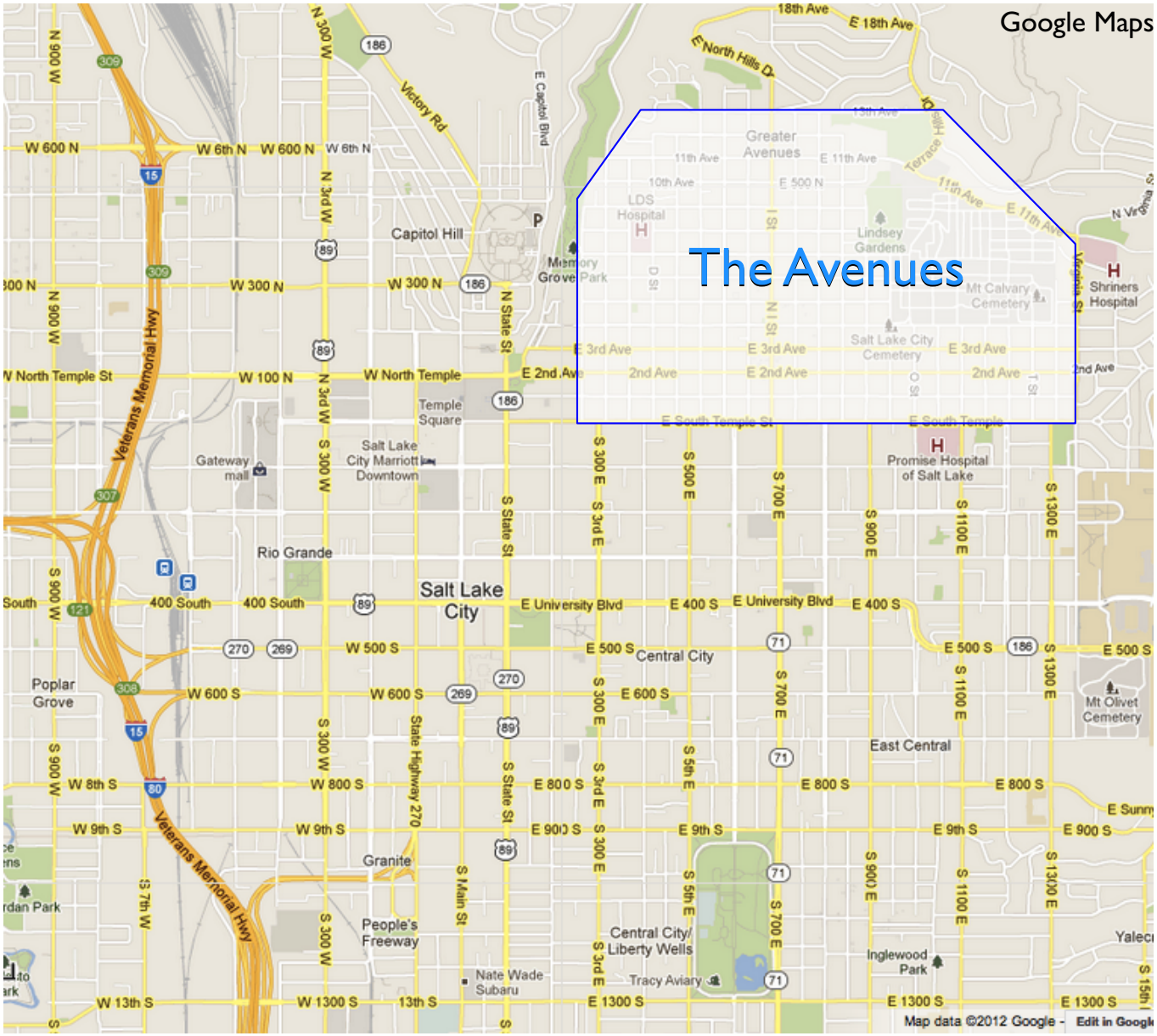
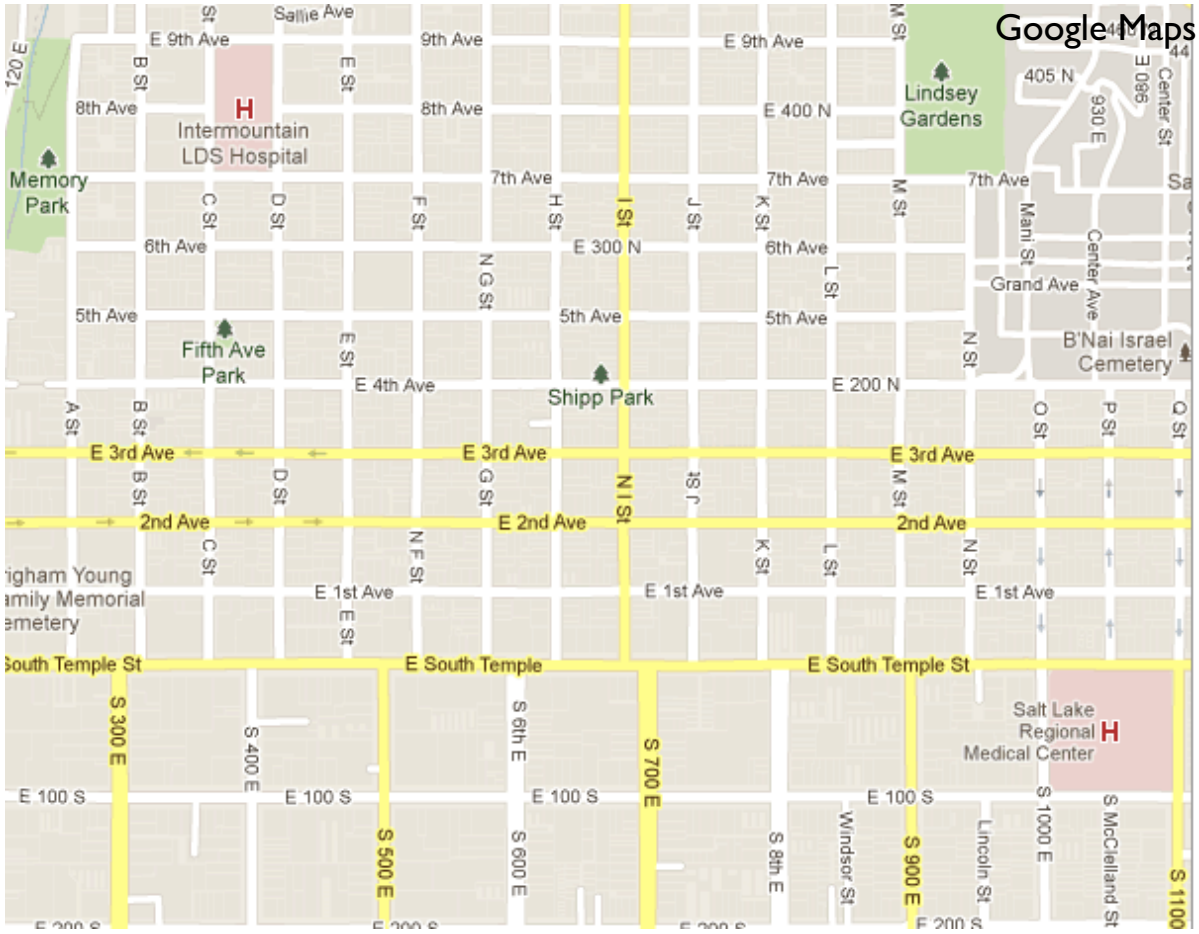


Example: Avenues

Convert streets in the Avenues to blocks east of the origin



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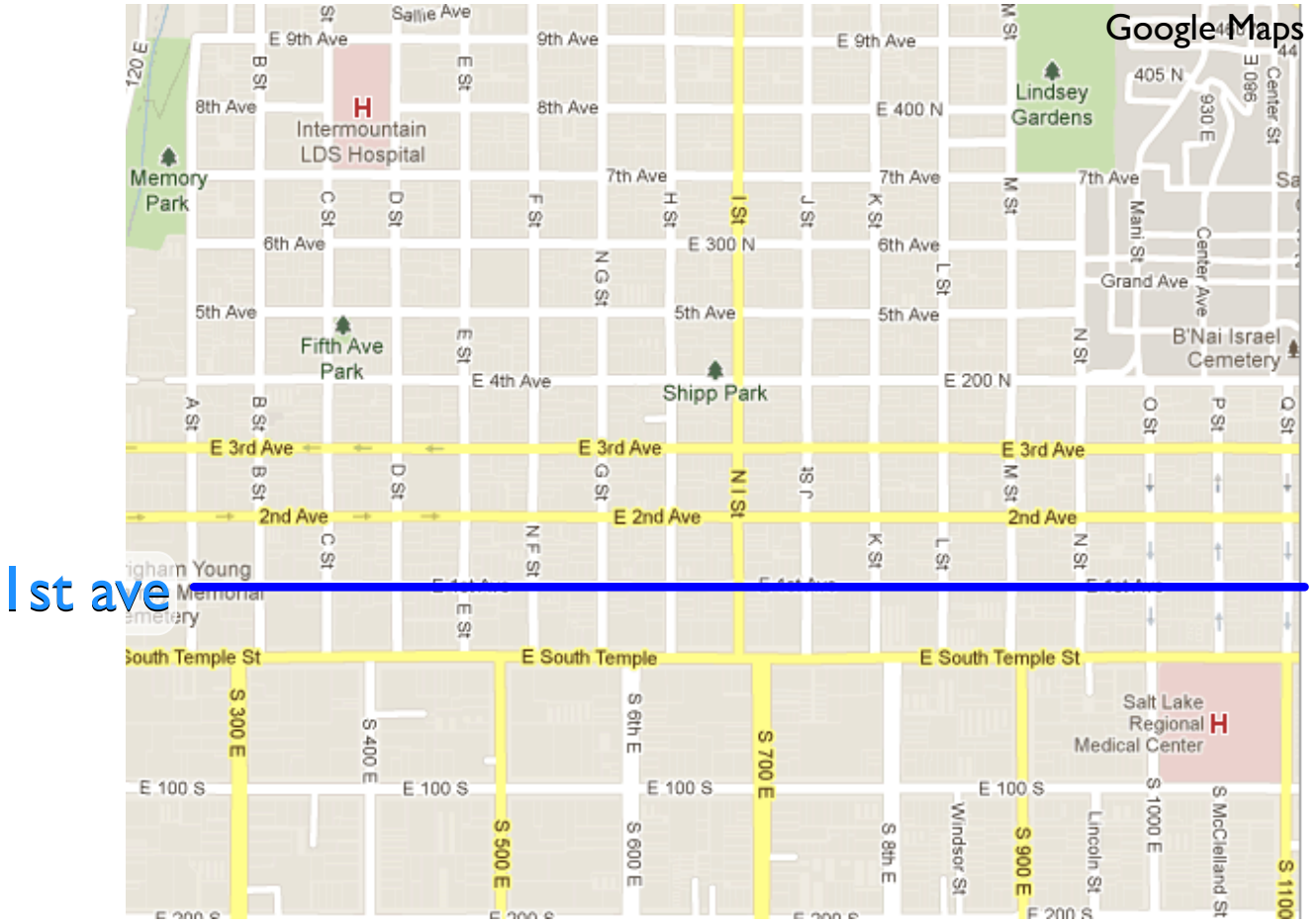

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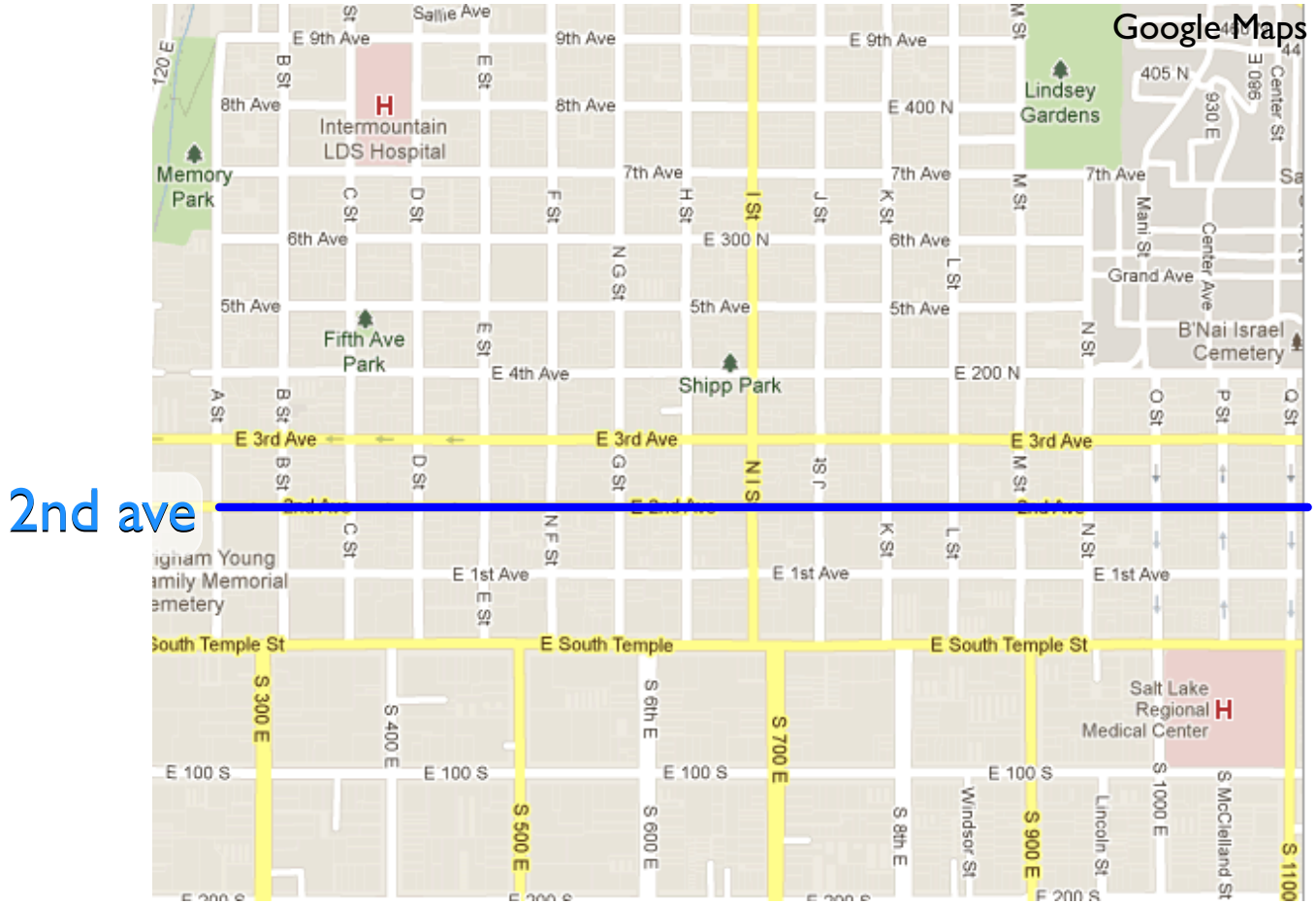

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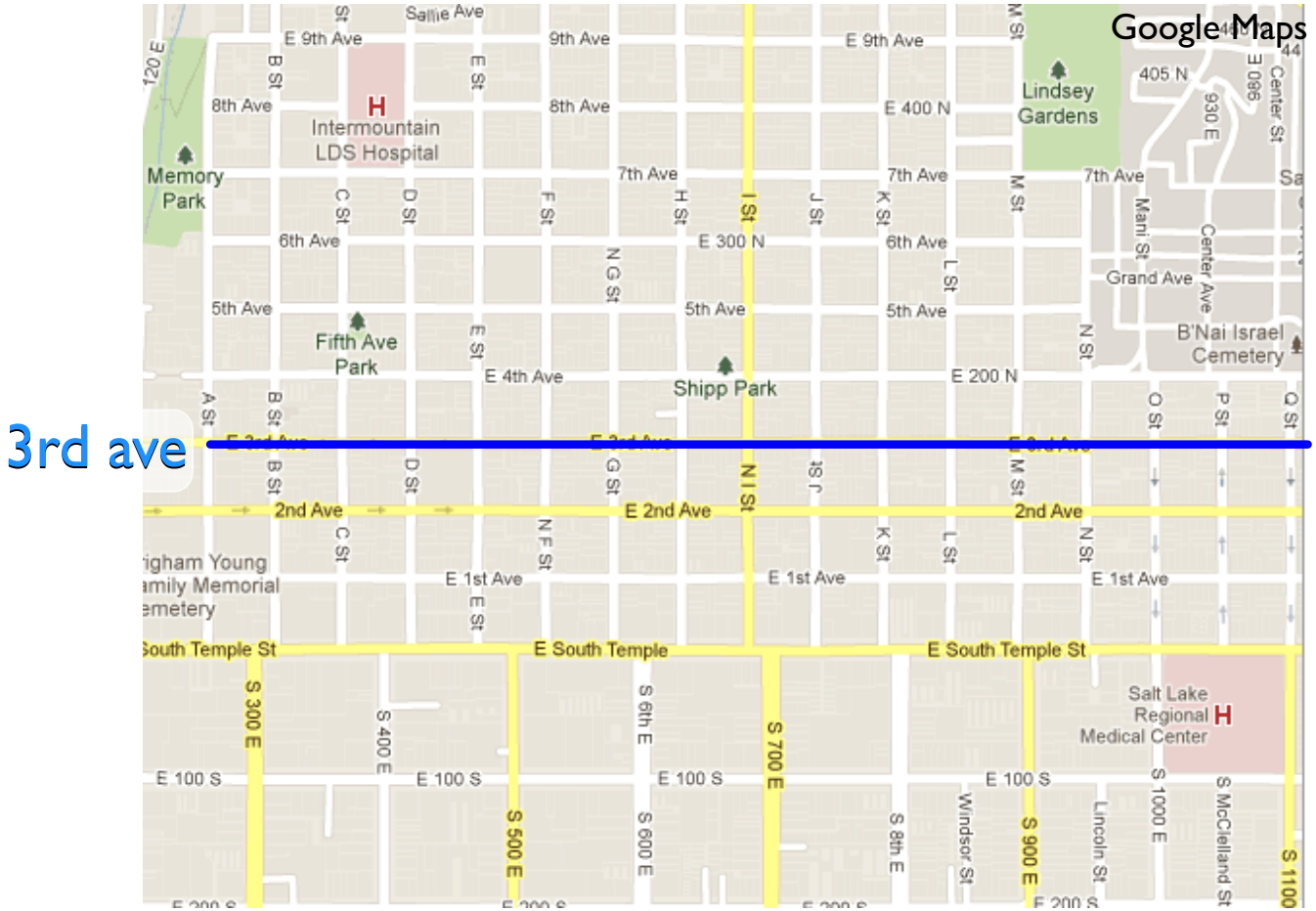

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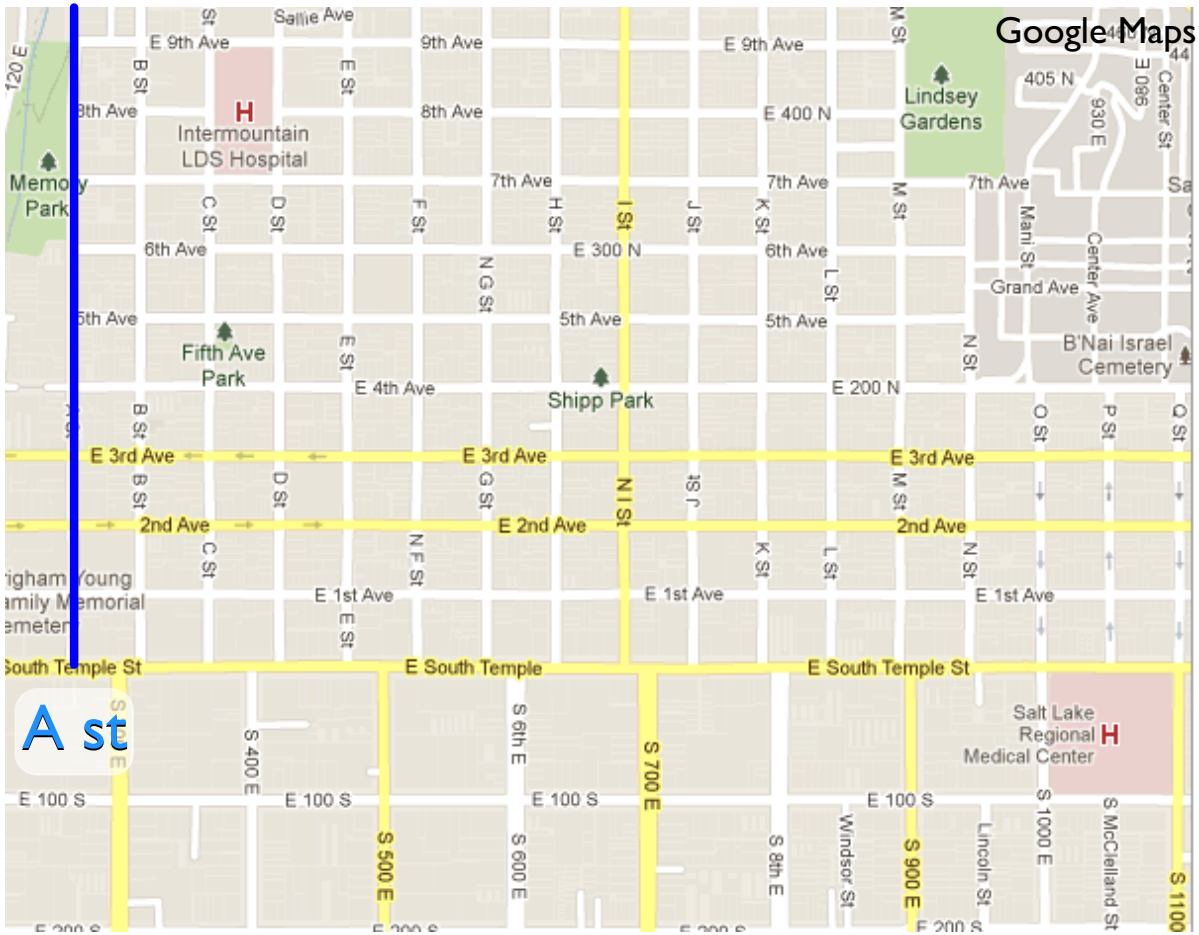

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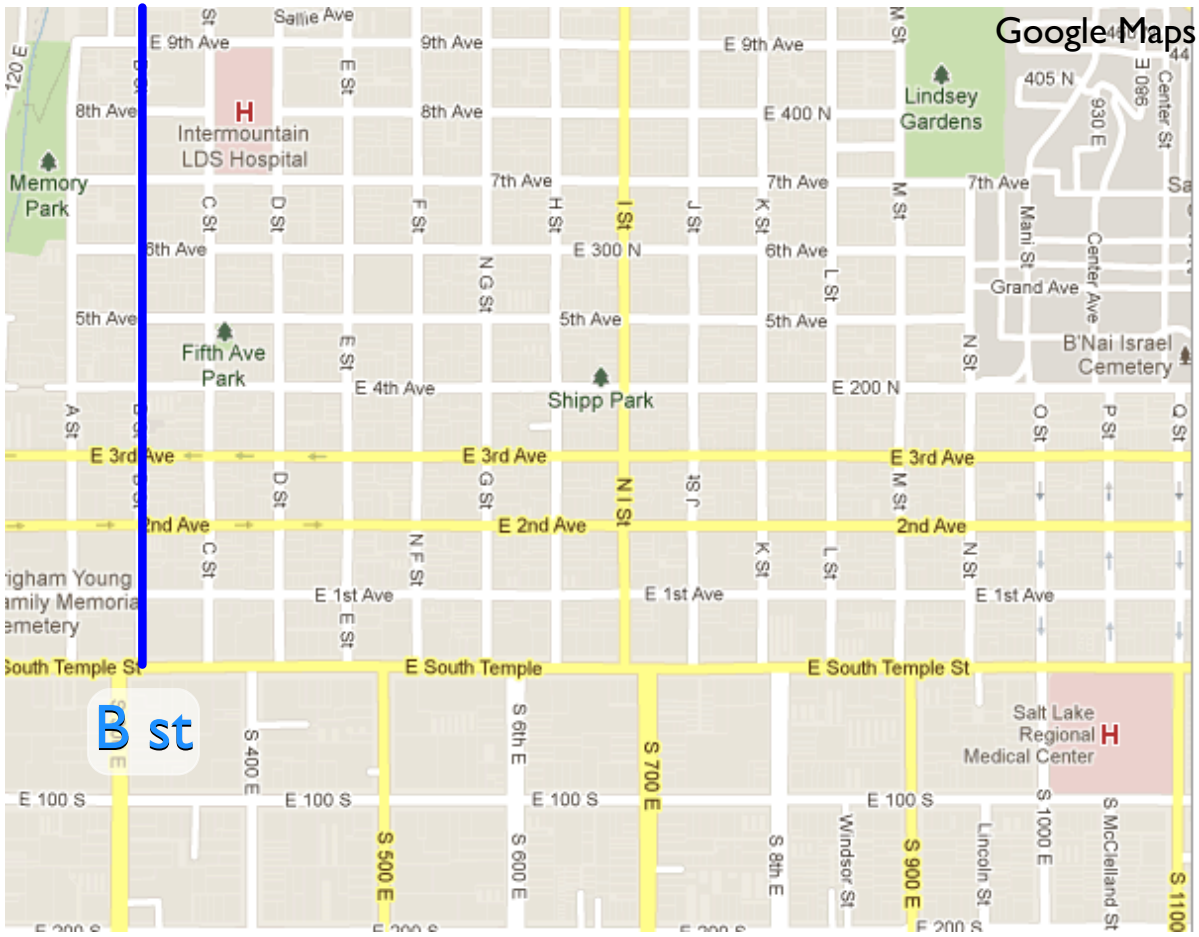

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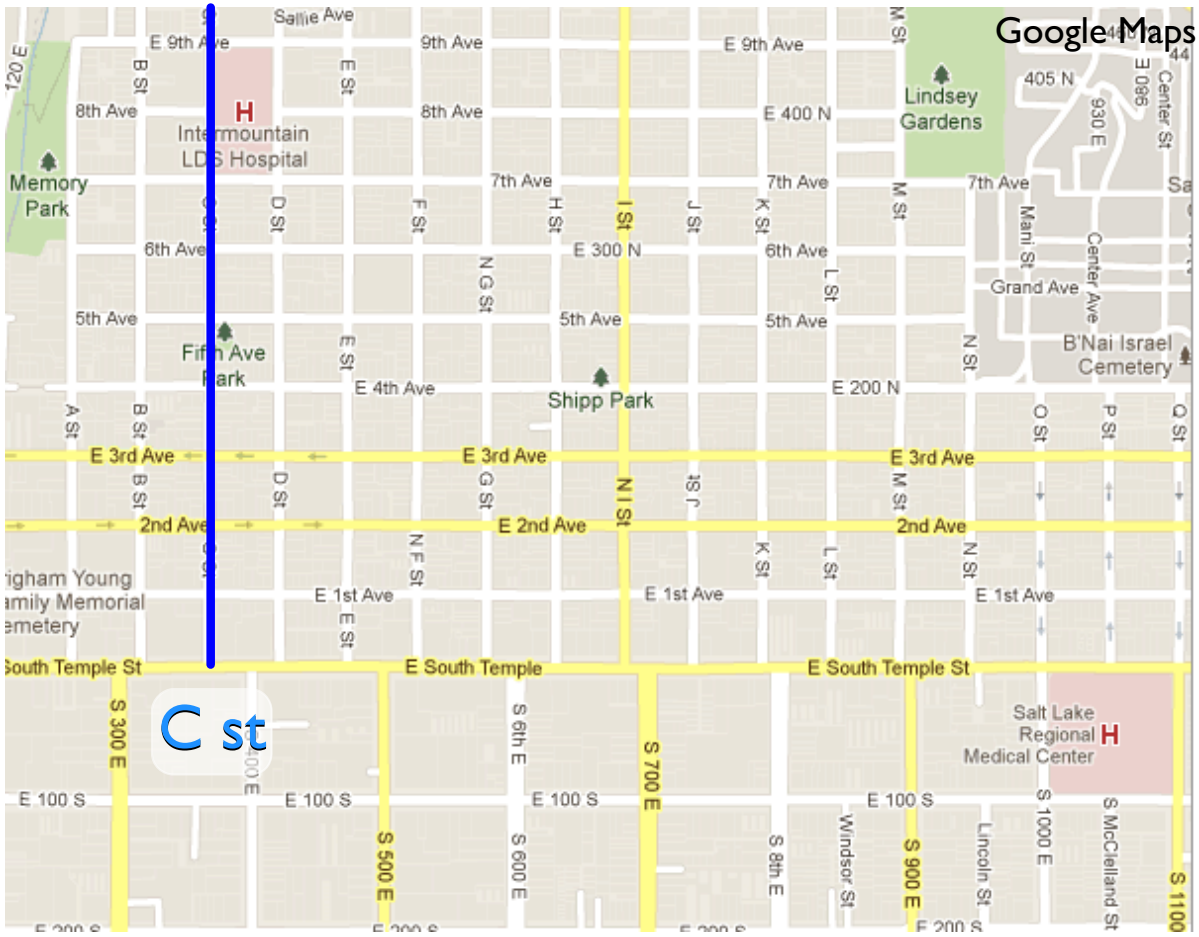

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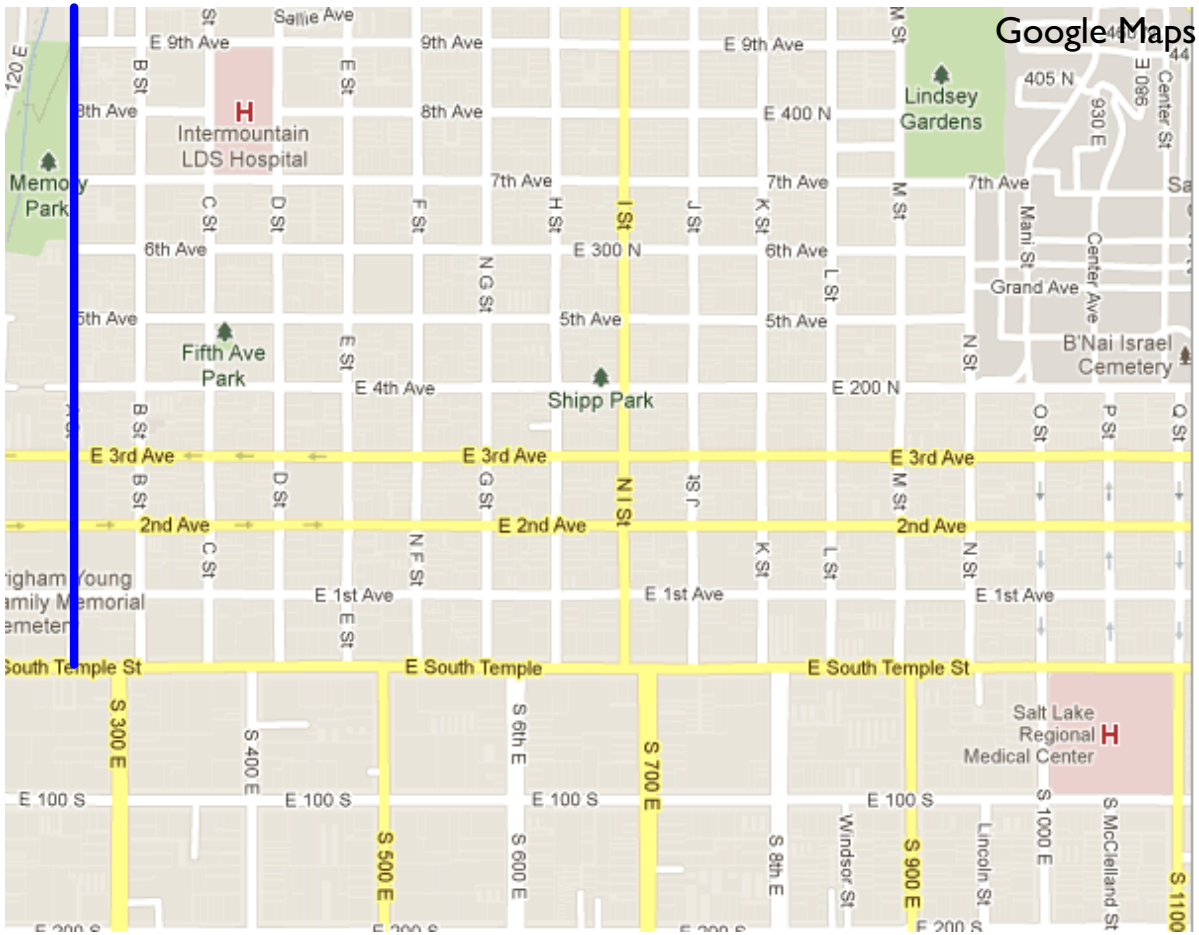

A st = 260 E

Example: Avenues

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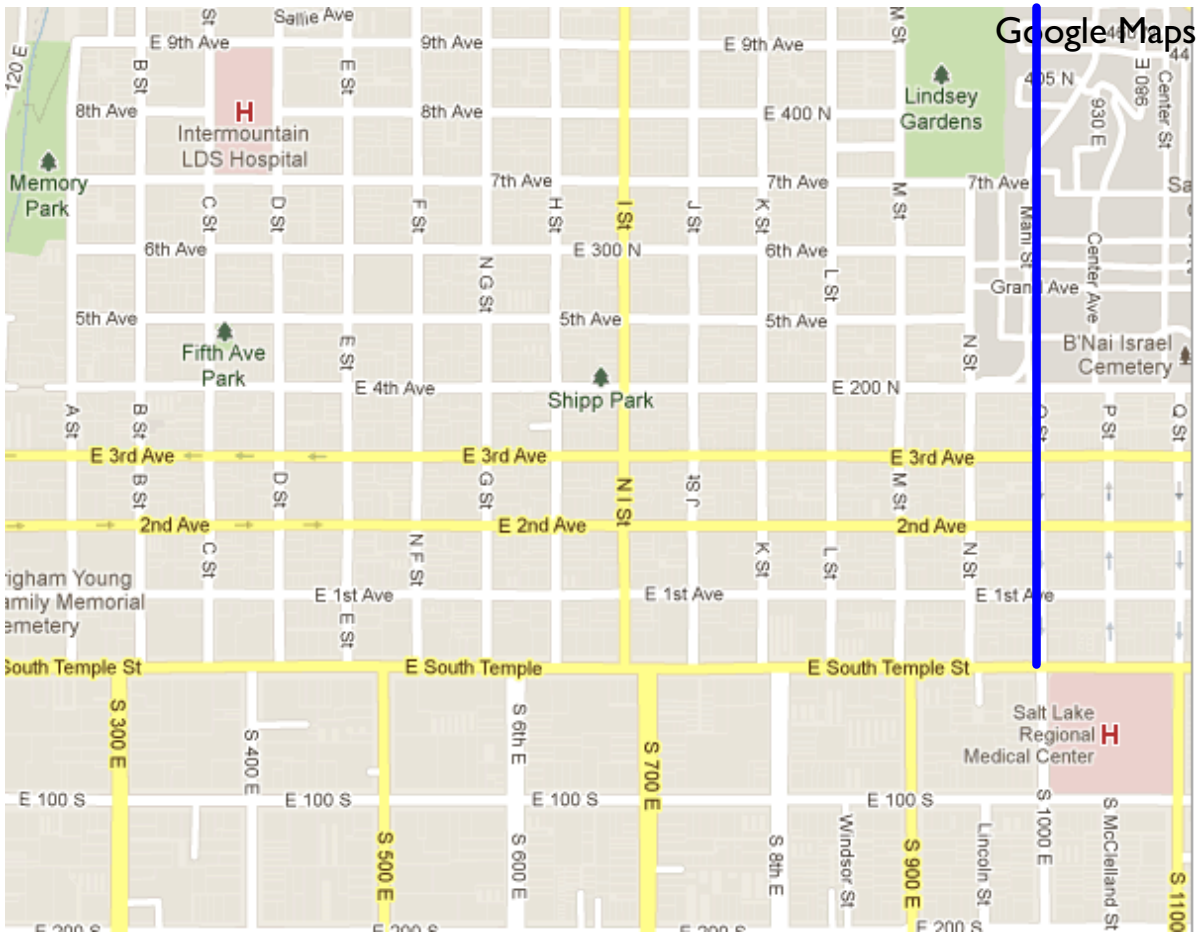

O st = 1000 E

Example: Avenues

Convert streets in the Avenues to blocks east of the origin

A St. = 260 E

...

O St. = 1000 E

...

- A street at 2.6
- 10 - 2.6 blocks in 14 streets

1 St. = 682.85... E

Two problems:

- Converting a letter to a position
- Converting a position to blocks east

Example: Avenues

```
; street->slc : string -> num
; Converts streets to blocks east of the origin:
(define (street->slc st)
  (+ 2.6 (* (street-index st)
            (/ (- 10 2.6) 14))))

; street-index : string -> num
; Converts "A" to 0, "B" to 1, etc.
(define (street-index st)
  (- (string->int st)
     (string->int "A")))
(check-expect (street-index "A") 0)
(check-expect (street-index "O") 14)

(check-expect (street->slc "A") 2.6)
(check-within (street->slc "I") 6.83 0.01)
(check-expect (street->slc "O") 10)
```