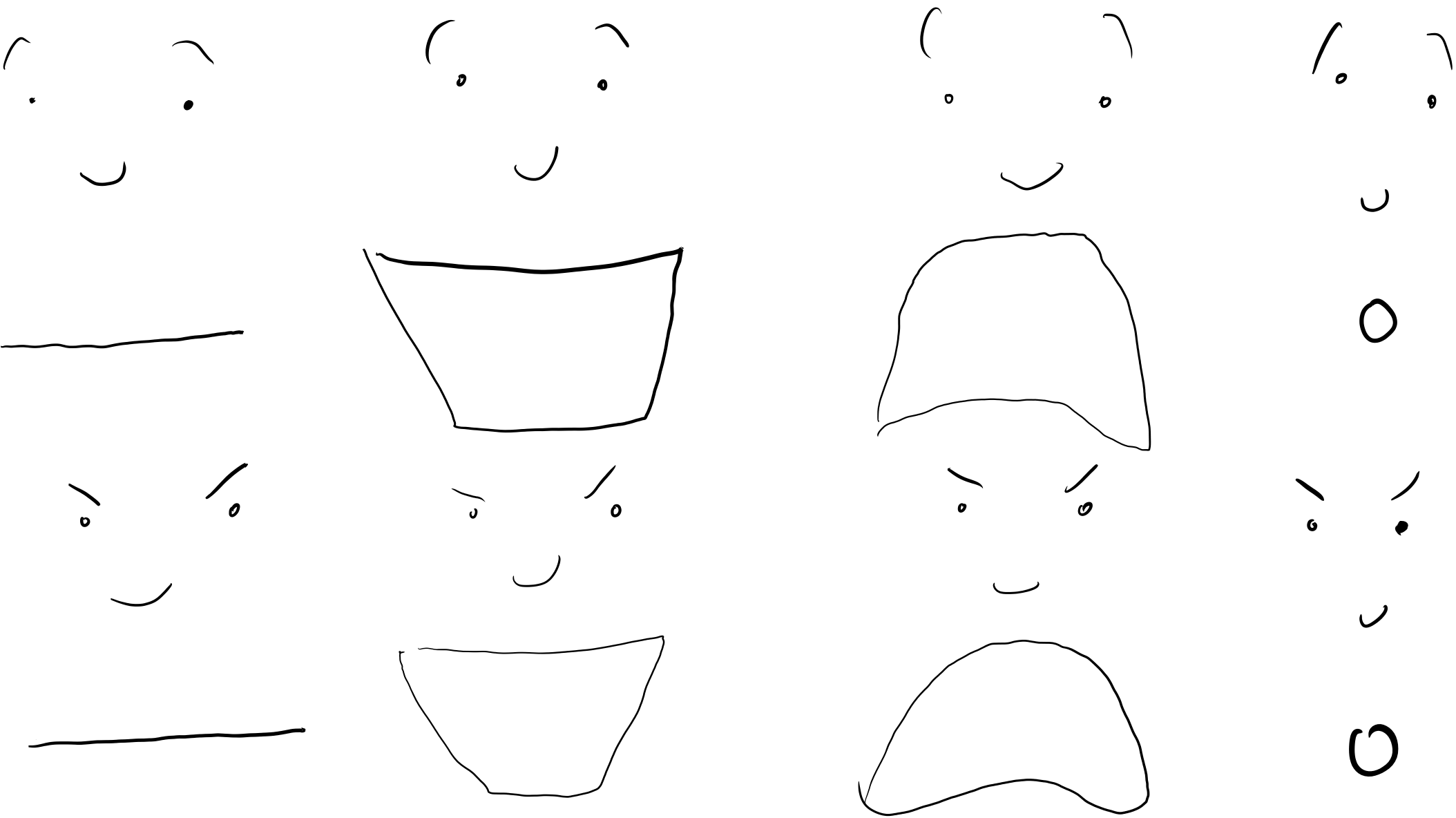


addr

number
where in memory

ptr

concept
where

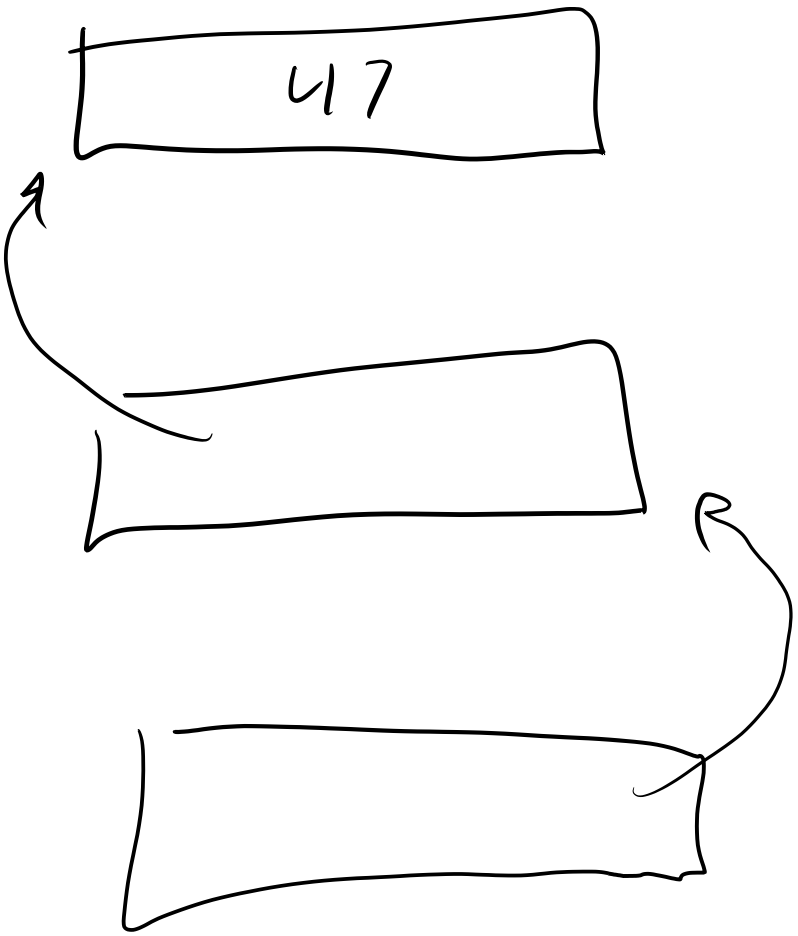
& x

address of

* x

pointer dereference
following ptr

Draw boxes and arrows



mem

0x2838 | 47

0x2400 | 0x2838

0x2288 | 0x2400

int * a =

int *a = &x

addr

int

123456789ABCDEF0

b

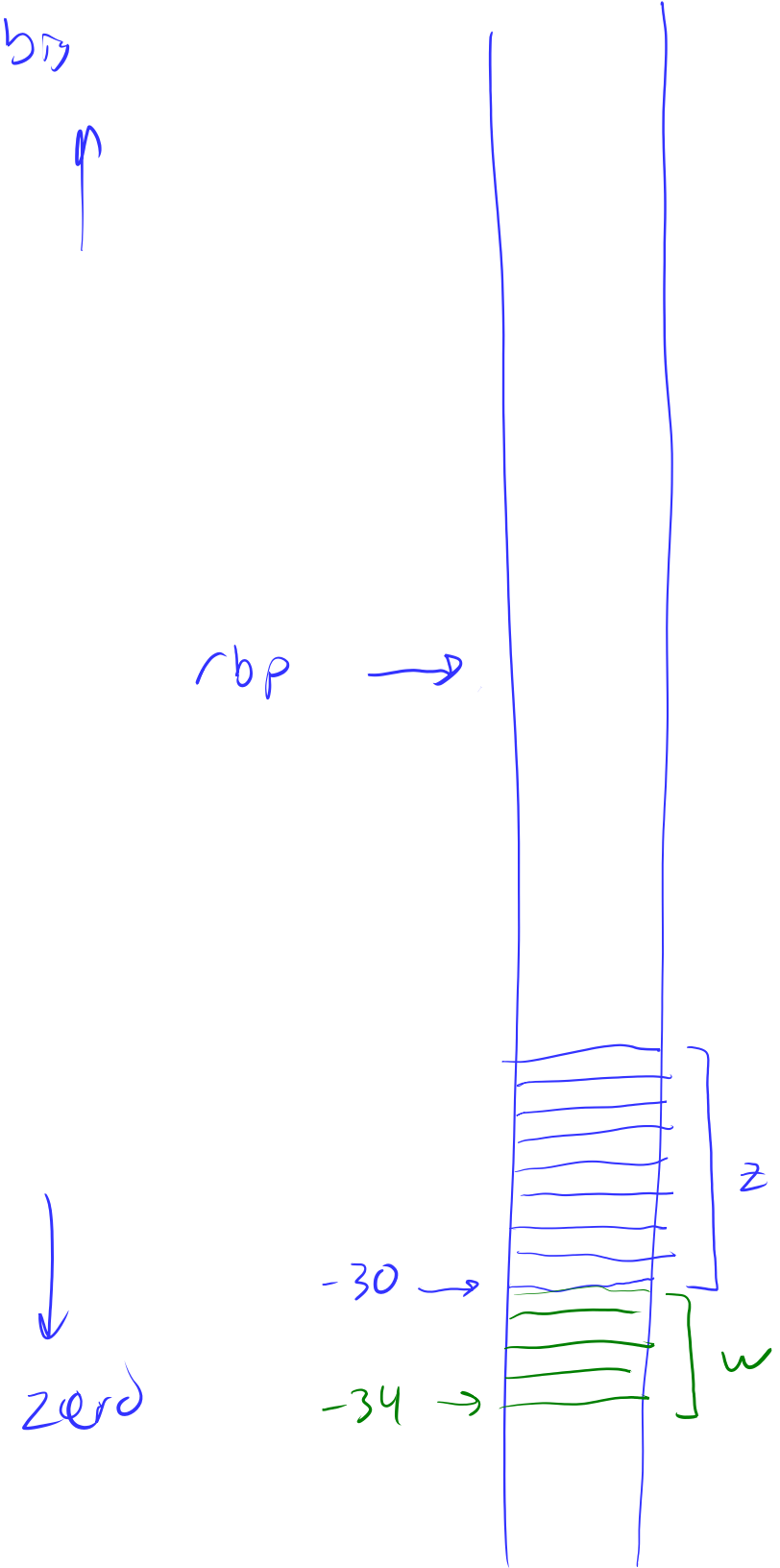
rax 9ABCDEF0

follow

y = *a

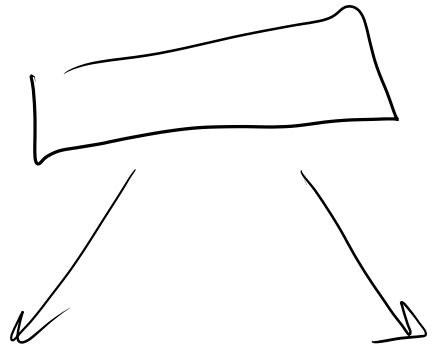
addr

int


rbp
z
-30
w
-34

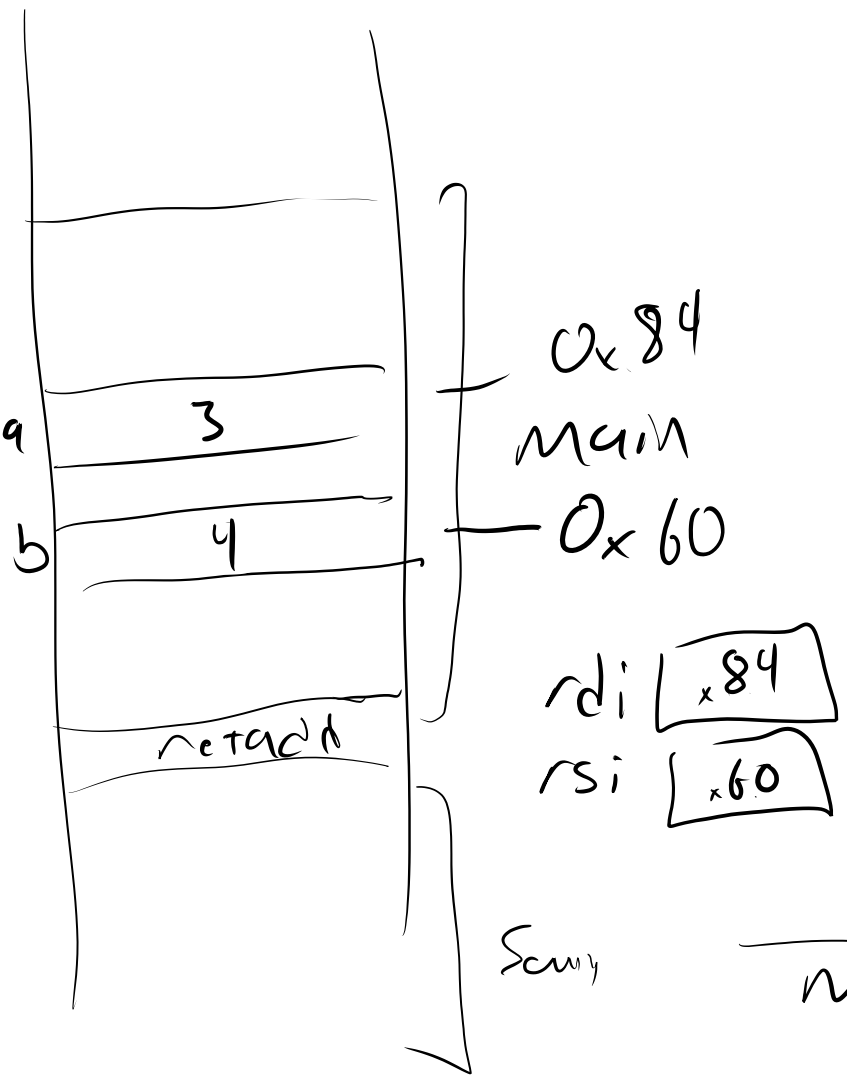
Why pointers?

- Data Structures
- let arguments change
- space (not copy big stuff)



```
struct bst_node {
    bst_node *left;
    bst_node *right;
    int val;
};
```

```
class BSTNode {
    BSTNode left, right;
    int val;
};
```




```
Swap ( int *x,  int *y)
    int tmp = *x;
    *x = *y;
    *y = tmp;
```

main

a = 3
b = 4
Swap(&a, &b)

int indexof(int val, int[] array)

↑
4B

1024 ints = 4K bytes

int val, addr of int[]

↑ ↑
4B 8B

Types

primitives
int & friends

pointers

next to each other

array

struct

Struct

```
struct a {
    int x;      // 4
    long y;     // 8
    char *z;    // 8
};
```

4 byte padding → (between `int x;` and `long y;`)

24 (total size)

```
struct a w = ...
```

w.x =

w.z = (char *)

*(w.z) = 'x'