Tricky Declarations
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- “If I could change something about C ...”
Remember two things

1. Start from the inside out (from the \textit{var} out)
2. Operator precedence order
   
   – [ ]
   
   – ( )
   
   _ *
Example

char (*v)[20];

start from the inside

Cheat sheet. order:
• [ ]
• ( )
• *
Example

it’s a pointer

char (*v)[20];

start from the inside

Cheat sheet. order:
• [ ]
• ()
• *
Example

char (*v)[20];

it’s a pointer to an array of 20

start from the inside

Cheat sheet. order:
• [ ]
• ( )
• *
Example

char (*v)[20];

it's a pointer to an array of 20

start from the inside

Cheat sheet. order:
• [ ]
• ( )
• *
int *v[3]
int *v[3]

array of 3 pointers to int
int *(v[3])
int *(v[3])

array of 3 pointers to int
int (*v)[3]
int (*v)[3]

pointer to an array of 3 ints
int *v()
int *v()

function returning a pointer to int
void(*v)(int);
void(*v)(int);

pointer to a function that takes an int argument and returns nothing
int(*v)(void);
int(*v)(void);

pointer to a function that takes no argument and returns an int
int(*v[])(())
int(*v[])(())

array of pointers to functions returning int
int*(*v[10])(())
int*(v[10])()

array of 10 pointers to functions which take no arguments and return an int pointer
int (*(*f())[13])(())
int (*(*f())[13])(())

a function returning a pointer to an array of 13 pointers to functions returning int
Avoiding these

• Use typedef
• Recall:
  – typedef int bool;
  – typedef unsigned long int uint64_t;
• Instead of int (**(*x[3])(()))[5]:
  
  typedef int fiveints[5];
  typedef fiveints* p5i;
  typedef p5i (*f_of_p5is)( );
  f_of_p5is x[3];

• x is an array of 3 elements, each of which is a pointer to a function returning an array of 5 ints