

Magic Numbers

Magic Numbers

- Some of the programs we've written in CS50 have some weird numbers thrown in there.
 - The height of Mario's pyramid is capped at 23, for example.
- What do those numbers mean? If someone looks at your program, is the meaning of 23 immediately obvious?
- Directly writing constants into our code is sometimes referred to as using **magic numbers**.

Magic Numbers

```
card deal_cards(deck name)
{
    for (int i = 0; i < 52; i++)
    {
        // deal the card
    }
}
```

- We've got a magic number in here. Do you see what it is?
 - More importantly, do you see a potential problem here? Particularly if this function is just one of many in a suite of programs that manipulate decks of cards.

Magic Numbers

```
card deal_cards(deck name)
{
    int deck_size = 52;
    for (int i = 0; i < deck_size; i++)
    {
        // deal the card
    }
}
```

- This fixes one problem, but introduces another.
 - Even if globally declared, what if some other function in our suite inadvertently manipulates `deck_size`. Could spell trouble.

Magic Numbers

- C provides a **preprocessor directive** (also called a **macro**) for creating symbolic constants.

```
#define NAME REPLACEMENT
```

- At the time your program is compiled, `#define` goes through your code and replaces `NAME` with `REPLACEMENT`.
 - If `#include` is similar to copy/paste, then `#define` is analogous to find/replace.

Magic Numbers

- C provides a **preprocessor directive** (also called a **macro**) for creating symbolic constants.

```
#define PI 3.14159265
```

- At the time your program is compiled, `#define` goes through your code and replaces `PI` with `3.14159265`.
 - If `#include` is similar to copy/paste, then `#define` is analogous to find/replace.

Magic Numbers

- C provides a **preprocessor directive** (also called a **macro**) for creating symbolic constants.

```
#define COURSE "CS50"
```

- At the time your program is compiled, `#define` goes through your code and replaces `COURSE` with `"CS50"`.
 - If `#include` is similar to copy/paste, then `#define` is analogous to find/replace.

Magic Numbers

```
#define DECKSIZE 52

card deal_cards(deck name)
{
    for (int i = 0; i < DECKSIZE; i++)
    {
        // deal the card
    }
}
```


Magic Numbers

```
#define DECKSIZE 32

card deal_cards(deck name)
{
    for (int i = 0; i < DECKSIZE; i++)
    {
        // deal the card
    }
}
```

Magic Numbers

```
#define DECKSIZE 50000

card deal_cards(deck name)
{
    for (int i = 0; i < DECKSIZE; i++)
    {
        // deal the card
    }
}
```