Javascript: 
Selection & Iteration

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SELECTION

if … else …
Recall building blocks

- Sequence of instructions
  - Assignment
  - I/O
    - alert
    - prompt
    - confirm
    - document.write

- Selection

- Iteration

- Sub-routine (suspend and resume)

Selection

- Pretty simple:
  
```javascript
if (boolean expression)
{ statement(s) }
```

- Examples:
  
```javascript
if (salary == 0)
{ alert("No salary for you!"); }
```

- Multiple-choices:
  
```javascript
if (boolean expression)
{ statement(s) }
else // if, else: reserved keywords ...
{ statement(s) }
```

- Boolean expression can be arbitrarily complex
  
- Statements too!
Examples

```javascript
var stdWeek = 40;
if (hours > 40) {
  stdHours = 40;
  otHours = hours - 40;
} else {
  stdHours = hours;
  otHours = 0;
}
salary = stdHours*rate + otHours*1.5*rate;
```

- Ideally, no magic numbers
  - More readable
  - Easier (and safer) to change

Example: what’s inside? Anything.

- Nested if statements

```javascript
if (x == 0)
  if (y == 0)
    s1
  else
    s2
else
  if (z == 0)
    s3
  else
    s4
```
Exercise

- What is the difference between:
  ```java
  if (x < 0) {s1}
  if (x < 10) {s2}
  if (x < 20) {s3}
  else {s4}
  ```

- Earn a candy in 2 minutes!

- Coded in selectExample.html
  - Try it!

What does this do?

```java
if (a > b)
{ var temp = a;
  a = b;
  b = temp;
}
```

- Mini-sort
  - Check if \( a \leq b \), and swap if necessary
Geek attack

```java
if (x == 0)
    x = x+1;
else x = x+2;
```

- **Note:** you don’t need `{ } if only one instruction
  - But still a bad idea to not use
    - You will forget to add `{ } when you add 2nd instruction
    - Some languages require `{ }
    - Easier to associate `else`
      ```java
      if (x == 0)
          if (y == 0) s1
          else s2
      ```
  - **Short-hand notation:**
    ```java
    x++  ⇔  x = x+1
    ```

Example

- **How to check if point (x,y) is inside or on circular arc?**
  - Radius of arc = 1
  - Condition: $x^2 + y^2 \leq 1$
    ```javascript
    if (x*x + y*y <= 1)
        alert("inside or on");
    else
        alert("outside");
    ```
Revisiting cash register

- Single item purchase with cash
  - Prompt for purchase cost of item
  - Add 7% sales tax
  - Show total
  - Prompt for amount of cash given by customer
  - Show change due

- Will code work always?
  - Not if cash is less than purchase price
  - How to fix?

One more useful thing: Math

- Computing absolute values:
  \[ y = \text{Math.abs}(x); \]

- Generating random numbers
  \[ x = \text{Math.random}(); \]
  - Returns a random number between \( 0 \ldots 1 \)
    - Only pseudo-random (but meets various tests)
  - Useful for games, simulations, ...

- How to get:
  - Different range: \( 1 \ldots 6 \) ?
  - Integer random number ?
    \[ x = \text{Math.round}(x); \]
    \[ x = \text{Math.floor}(x); \]