CISC 3250
Systems Neuroscience

Matlab, part 3:
Functions

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Similar goal, similar code

Goal: compute motion with

2 time-point delay

```
targ=5;
actl(1)=0;
actl(2)=0;
actl(3)=0;
for n=3:31,
 sens(n)=actl(n-2);
 mv=0.5*(targ-sens(n));
 actl(n+1)=actl(n)+mv;
end;
```

4 time point delay

```
targ=5;
actl(1)=0;   actl(2)=0;
actl(3)=0;   actl(4)=0;
actl(5)=0;
for n=3:31,
 sens(n)=actl(n-4);
 mv=0.5*(targ-sens(n));
 actl(n+1)=actl(n)+mv;
end;
```

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Similar goal, similar code

Goal: compute motion with

2 time-point delay

```
targ=5;
actl(1)=0;
actl(2)=0;
actl(3)=0;
for n=3:31,
 sens(n)=actl(n-2);
 mv=0.5*(targ-sens(n));
 actl(n+1)=actl(n)+mv;
end;
```

d time point delay

```
targ=5;
actl=zeros(32,1);
for n=3:31,
 sens(n)=actl(n-d);
 mv=0.5*(targ-sens(n));
 actl(n+1)=actl(n)+mv;
end;
```

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Functions as reusable code

Function definition
in modelMotion.m

```
function actl=modelMotion(d)

targ=5;
actl=zeros(32,1);
for n=3:31,
 sens(n)=actl(n-d);
 mv=0.5*(targ-sens(n));
 actl(n+1)=actl(n)+mv;
end;
```

Use function

```
actl=modelMotion(2)
plot(actl)
```

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Function syntax

- Define function in separate text file:
  `nameOfFunc.m`
- In file, define function:

```
function output=fnName(input1, …, inputN)

Commands-to-perform
```

```
function actl=modelMotion(d)

targ=5;
actl=zeros(32,1);
for n=3:31,
 sens(n)=actl(n-d);
```

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Editing a new .m file

- In Matlab: edit funcName
- In Windows: Notepad
- In Mac: TextEdit (save as Simple Text file)
- In Linux: vim, emacs

- Save in the directory where you store .mat data files

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Simple example

- Write function `sumBig` that takes the vector `v` and the number `n`, and returns the sum of all elements in `V` greater than `n`
- Example: `sumBig([3,0,2,6,1,7],4)` returns `13`
- Example: `sumBig([20,-10,14,8,2],10)` returns `34`

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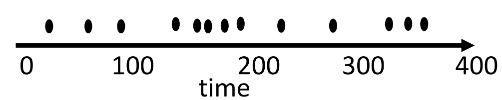
More complex example

- Write function `computeRate` that takes the vector of spike outputs `S` and the window size `w`, and returns the spike rate over windows of size `w`



- Example: `computeRate(S,400)` returns `[13]`
- Example: `computeRate(S,200)` returns [8, 5]
- Example: `computeRate(S,100)` returns [3, 5, 2, 3]

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