Week 7: For Loops

Elena & Willa
10/11/2022

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What is a loop? What is a for loop?

Loop - the action of doing something over and over again

For Loop - type of loop that has a pre-specified beginning and end; used when you want to repeat an action a certain number of times

Examples:
- "Set the table for 4 people"
- "Make 10 burritos"
- Chicken dance!

Example: Imagine you're giving instructions to someone who has never set a table before for 4

Do this 4 times:

- Put out placemat
- Put out plate
- Put out napkin
- Place fork on napkin on left side
- Place knife then spoon on right side of the plate
- Put glass on right side of placemat

Another example

I'm having a Halloween party. I need to make a guest list and send text messages to everyone to invite them.

I could do a group text, but I figured it would be more personal to send individual messages.

```
guest_list = Willa, Roya, Elena, Emily, Smriti
```

That's it for now. I can always add more people later.

```
guest_list = Willa, Roya, Elena, Emily, Smriti
```

Now that I have my list, I'm going to write my message:

```
message = "I'm having a Halloween Party on 10/31! The party starts at
9pm. I hope to see you there!"
```

Sweet! Now that I have my guest list and message, I'm ready to start sending text invites **to each person on the guest list**.

To Willa: send(message)
To Roya: send(message)
To Elena: send(message)
… etc.

➡️

For each person on the guest list:
send(message)

Goal:

sent

To: **345-943-0876**,
Hi **Willa**! I'm having a Halloween Party
on 10/31! The party starts at 9pm. I
hope to see you there!

To: **206-738-9942**,
Hi **Elena**! I'm having a Halloween Party on
10/31! The party starts at 9pm. I hope to see
you there!

To: **548-224-0381**,
Hi **Roya**! I'm having a Halloween Party on
10/31! The party starts at 9pm. I hope to see
you there!

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Anatomy of a for loop

```
for (i in "some range"){

"do something"

}
```

Anatomy of a for loop

index/iterator.
Exists in the scope of
the loop

```
for (i in "some range"){

"do something"

}
```

Anatomy of a for loop

What are you iterating over?
- A list of participants?
- A range of numbers?

```
for (i in "some range"){

"do something"

}
```

Anatomy of a for loop

What are you iterating over?
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for (i in "some range"){

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What a values should "i" take??

Anatomy of a for loop

What are you iterating over?
- A list of participants?
- A range of numbers?

```
for (i in "some range"){

    "do something"

}
```
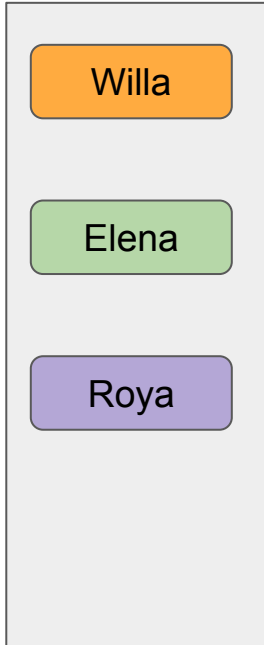
What a values should "i" take??

What do you want to do in the loop?
- Multiply "i" by another value
- Combine with another string?
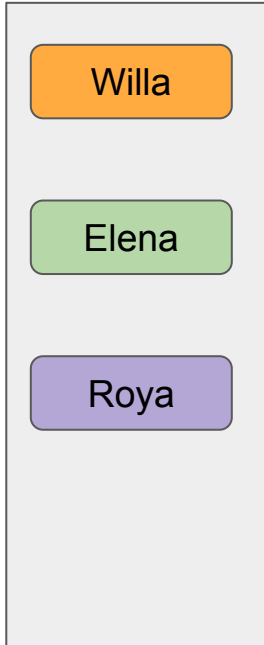- Save a new variable?

The logic of for loops

guest_list

Willa

Elena

Roya

length(guest_list) = 3, so loop stops at i = 3

```
for (i in 1:3) {

print(guest_list[i])

}
```

The logic of for loops

guest_list

i = 1
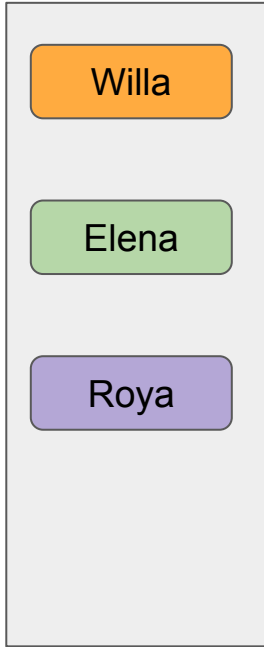
Willa

Elena

Roya

```
for (i in 1:3) {

print(guest_list[i])

}
```

The logic of for loops

guest_list

Willa

Elena

Roya

i = 2

```
for (i in 1:3) {

print(guest_list[i])

}
```

The logic of for loops

guest_list

Willa

Elena

i = 3   Roya

```
for (i in 1:3) {

print(guest_list[i])

}
```

The logic of for loops

guest_list

Willa

Elena

i = 3

Roya

```
for (i in 1:3)) {

print(guest_list[i])

}
```
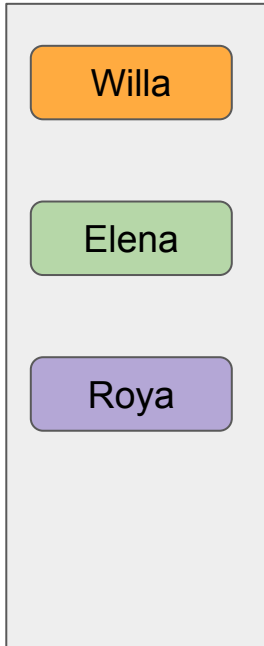
i takes on values 1:3

Print the guest for each value of i.

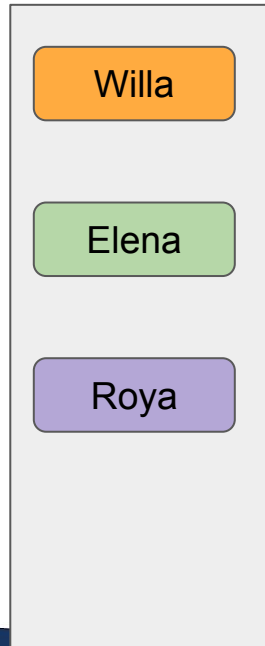# Let's use this idea to write a personalized message

Willa

Elena

Roya

Print a message that says "hi <guest name>. "I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!"

What needs to change each time?

What stays the same?

Let's use this idea to write a personalized message

Willa

Elena

Roya

iterate over guest list

Print a message that says "hi **<guest name>**. "I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!"

The message stays the same

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We can use indexing to personalize the message

Willa

Elena

Roya

```
message = "I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!"

for (i in 1:3) {

print(paste0("hi", guest_list[i], "message")

}
```

We can use indexing to personalize the message

i = 1

Willa

Elena

Roya

```
message = "I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!"

for (i in 1:3) {

print(paste0("hi", guest_list[i], message")

}
```

Hi **Willa**! I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

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We can use indexing to personalize the message

i = 2

```
message = "I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!"

for (i in 1:3) {

print(paste0("hi", guest_list[i], message")

}
```

Hi **Elena**! I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

We can use indexing to personalize the message
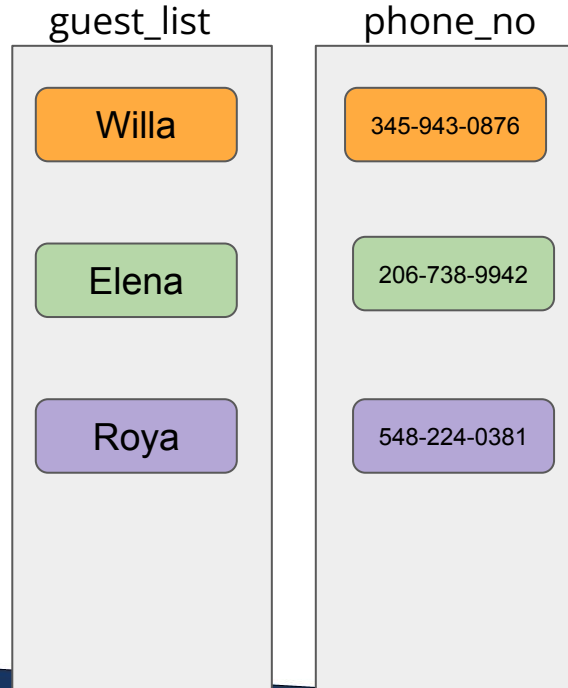


```
message = "I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!"

for (i in 1:3) {

print(paste0("hi", guest_list[i], message")

}
```

Hi **Roya**! I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

The concept of indexing allows us to include information from more vectors

The concept of indexing allows us to include information from more vectors

guest_list   phone_no

Willa	345-943-0876
Elena	206-738-9942
Roya	548-224-0381

To: **345-943-0876**,
Hi **Willa**! I'm having a Halloween Party on 10/31! The party starts at 9pm. I hope to see you there!

The context of indexing allows us to include information from more vectors

guest_list

Willa

Elena

Roya

phone_no

345-943-0876

206-738-9942

548-224-0381

```
for (i in 1:3) {

print(paste0("To:", phone_no[i],

"hi", guest_list[i], message")

}
```

The concept of indexing allows us to include information from more vectors

guest_list

i = 1

Willa

Elena

Roya

phone_no

345-943-0876

206-738-9942

548-224-0381

```
for (i in 1:3) {

print(paste0("To:", phone_no[i],

"hi", guest_list[i], message")

}
```
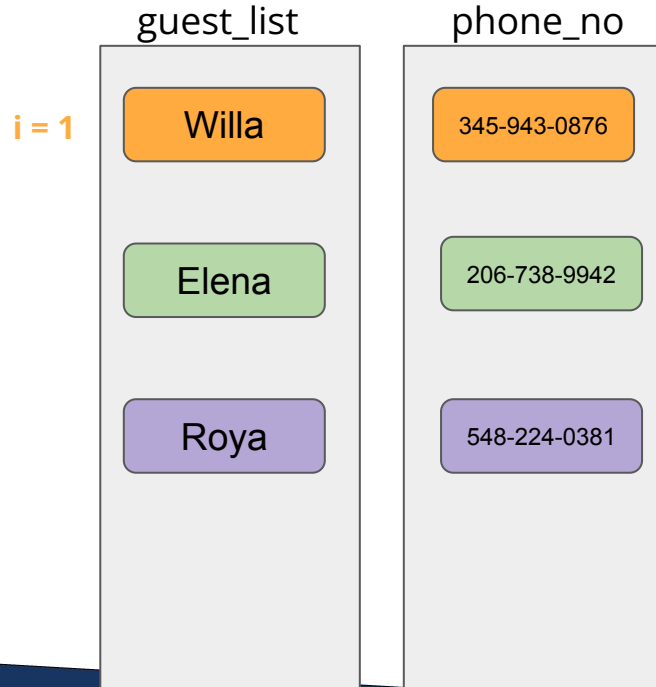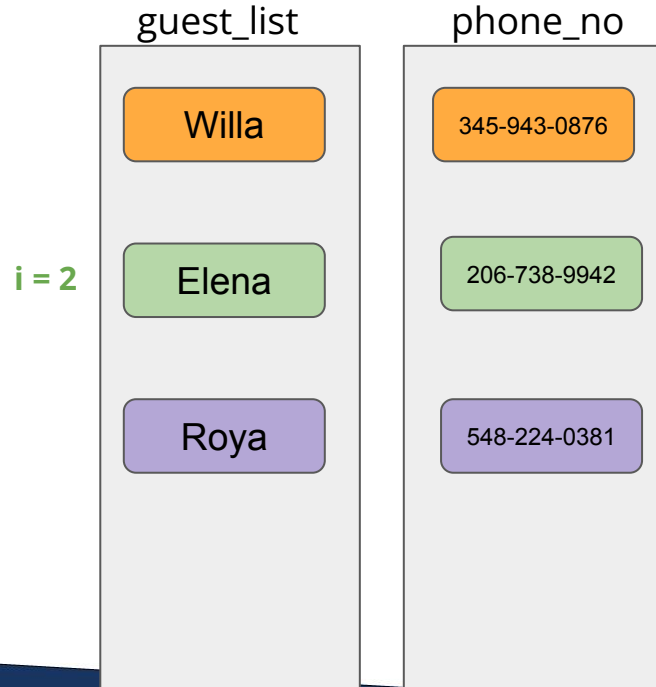
To: **345-943-0876**,
Hi **Willa**! I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

The concept of indexing allows us to include information from more vectors

guest_list

Willa
Elena
Roya

i = 2

phone_no

345-943-0876
206-738-9942
548-224-0381

```
for (i in 1:3) {

print(paste0("To:", phone_no[i],

"hi", guest_list[i], message")

}
```

To: **206-738-9942**,
Hi **Elena**! I'm having a Halloween Party on 10/31!
The party starts at 9pm. I hope to see you there!

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The concept of indexing allows us to include information from more vectors

guest_list

| Willa |

| Elena |

i = 3 | Roya |

phone_no

| 345-943-0876 |

| 206-738-9942 |

| 548-224-0381 |

```
for (i in 1:3) {

print(paste0("To:", phone_no[i],

"hi", guest_list[i], message")

}
```

To: **548-224-0381**,
Hi **Roya**! I'm having a Halloween Party on 10/31!
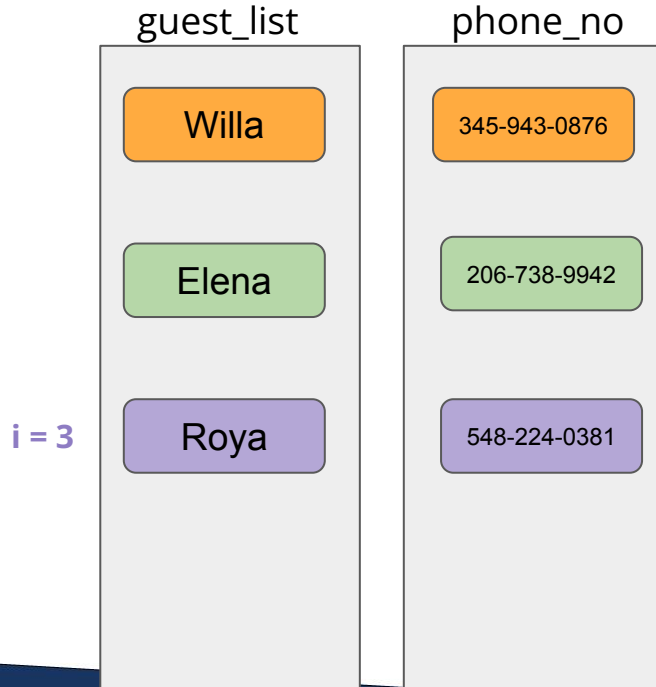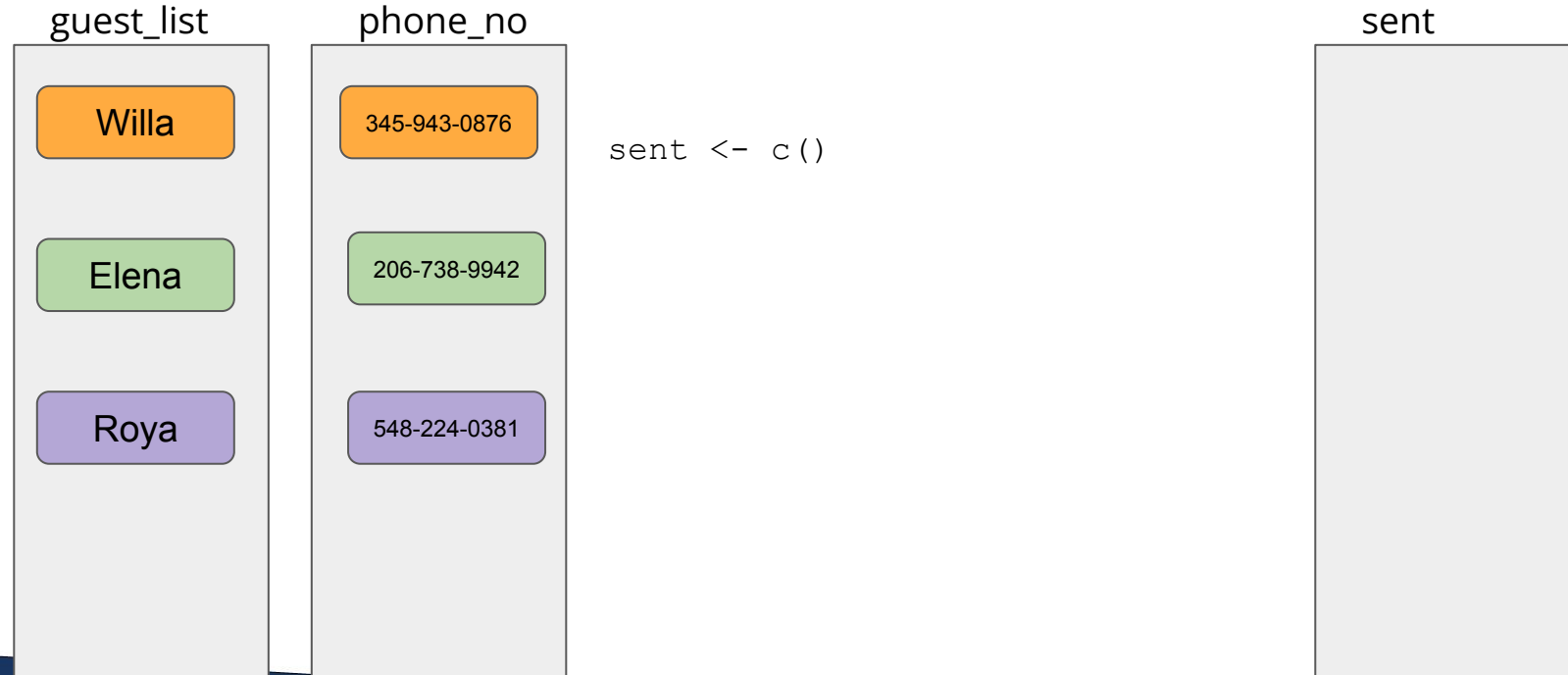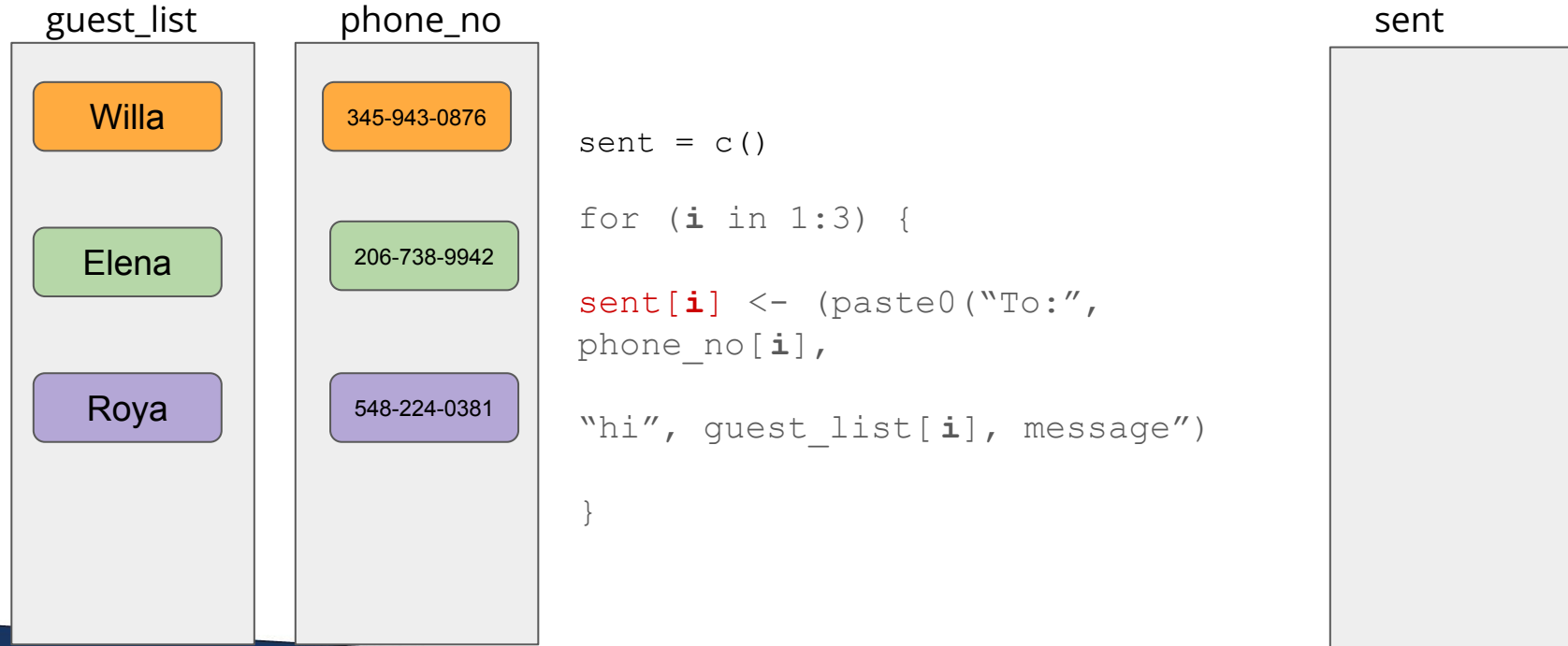The party starts at 9pm. I hope to see you there!

We can also use indexing to save the output to a new vector

guest_list

Willa

Elena

Roya

phone_no

345-943-0876

206-738-9942

548-224-0381

```
sent <- c()
```

sent

We can also use indexing to save the output to a new vector

guest_list

Willa

Elena

Roya

phone_no

345-943-0876

206-738-9942

548-224-0381

sent

```
sent = c()

for (i in 1:3) {

sent[i] <- (paste0("To:",
phone_no[i],

"hi", guest_list[i], message")

}
```

We can also use indexing to save the output to a new vector

guest_list

i = 1

Willa

Elena

Roya

phone_no

345-943-0876

206-738-9942

548-224-0381

sent

"To: 345.."

```
sent = c()

for (i in 1:3) {

sent[i] <- (paste0("To:",
phone_no[i],

"hi", guest_list[i], message)

}
```

We can also use indexing to save the output to a new vector

guest_list

> Willa

> Elena

> Roya

i = 2

phone_no

> 345-943-0876

> 206-738-9942

> 548-224-0381

```
sent = c()

for (i in 1:3) {

sent[i] <- (paste0("To:",
phone_no[i],

"hi", guest_list[i], message)

}
```

sent

> "To: 345.."

> "To: 206.."

We can also use indexing to save the output to a new vector

guest_list

Willa

Elena

Roya

i = 3

phone_no

345-943-0876

206-738-9942

548-224-0381

```
sent = c()

for (i in 1:3) {

sent[i] <- (paste0("To:",
phone_no[i],

"hi", guest_list[i], message)

}
```

sent

"To: 345.."

"To: 206.."

"To: 548.."

Anatomy of a for loop

What are you iterating over?
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```
for (i in "some range"){

    "do something"

}
```

What a values should "i" take??

What do you want to do in the loop?
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- Save a new variable?