

Program Design

Lecture 4

Structures

- Sequential statements
 - Input and Output
 - Variable creation and assignment
 - Arithmetic operations
- Decisions
 - IF statements
- Iterations
 - WHILE and FOR loops

Boolean Expressions

- $X > Y$
- $A == B$
- $C \leq D$

IF Statement

Pseudocode

```
IF age > 67  
    fare = 0  
ENDIF
```

Python

```
if age > 67:  
    fare = 0
```

If Else

Pseudocode

```
IF age > 67
    fare = 0
ELSE
    fare = 5
ENDIF
```

Python

```
if age > 67:
    fare = 0
else:
    fare = 5
```

If Else

Pseudocode

IF age > 67

 fare = 0

ELSE

 fare = 5

ENDIF

Python

if age > 67:

 fare = 0

else:

 fare = 5

Question! If age == 67 what would the fare be?

A) Fare == 5

B) Fare == 0

Nested If

Pseudocode

```
IF record-code == 'A'
    counterA = counterA+1
ELSE
    IF record-code == 'B'
        counterB = counterB + 1
    ELSE
        IF record-code == 'C'
            counterC = counterC + 1
        ELSE
            error-counter = error-counter + 1
        ENDIF
    ENDIF
ENDIF
ENDIF
```

Python

```
if record_code == 'A':
    counterA = counterA+1
else:
    if record_code == 'B':
        counterB = counterB+1
    else:
        if record_code == 'C':
            counterC = counterC+1
        else:
            error_counter = error_counter+1
```

If Elseif

Pseudocode

```
IF record-code == 'A'  
    increment counterA  
ELSEIF record-code == 'B'  
    increment counterB  
ELSEIF record-code == 'C'  
    increment counterC  
ELSE  
    increment error-counter  
ENDIF
```

Python

```
if record_code == 'A':  
    counterA = counterA+1  
elif record_code == 'B':  
    counterB = counterB+1  
elif record_code == 'C':  
    counterC = counterC+1  
else:  
    error_counter = error_counter+1
```


While loop

```
WHILE condition is true  
    loop body instructions  
ENDWHILE
```

Sum positive integers from user. When the user is finished entering numbers, they should enter 0.

While Loop

Pseudocode

total = 0

x = 1

WHILE x not equal to 0

 ask for user input

 store input in x

 total = total + x

ENDWHILE

Python

total = 0

x = 1

while x != 0:

 x = int(input("Please enter an...
 integer:\n"))

 total = total + x

For Loop

Pseudocode

total = 0

FOR i =0;i<10; i = i+1

 ask for user_input

 x = user_input

 total = total + x

ENDFOR

Python

```
for i in range(0,10):
```

```
    x = input("Please enter an...  
            integer:\n")
```

```
    total = total + int(x)
```

```
print('total =', total)
```

The same as previous with While Loop

Pseudocode

i = 0

total = 0

WHILE i < 10

 ask for user input

 store input in x

 total = total + x

 i = i + 1

ENDWHILE

Python

i = 0

total = 0

while i < 10:

 x = int(input("Please enter an...
 integer:\n"))

 total = total + x

 i = i + 1