



AUBURN
ENGINEERING

ENGR 1110

Module 3 Lecture

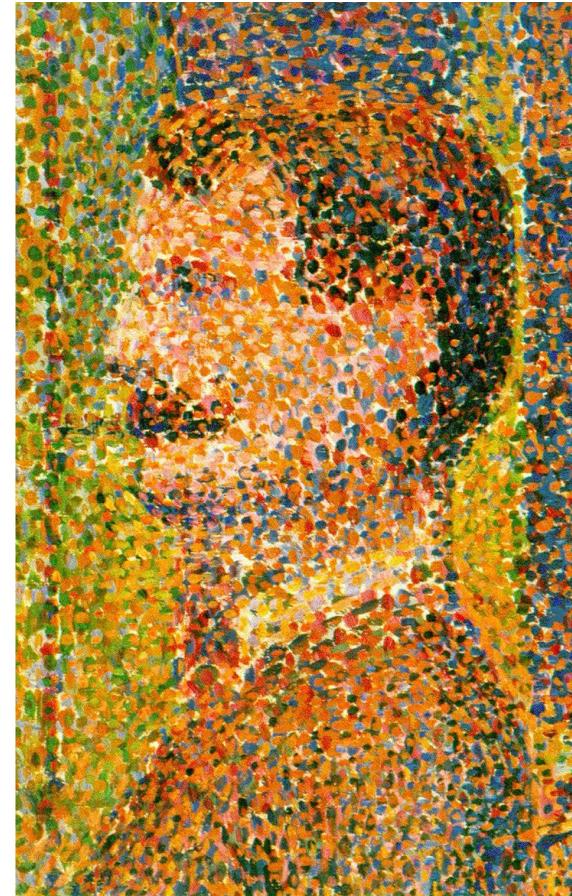
Workflow & Due Dates

Showing activity for entire class		zyLabs	Challenge	Participation	
<input type="checkbox"/>	1. Spreadsheets	 83%	 97%	▼	
<input type="checkbox"/>	2. Introduction to Python	 91%	 84%	 95%	▼
<input type="checkbox"/>	3. Variables and Expressions	 92%	 84%	 93%	▼
<input type="checkbox"/>	4. Types	 85%	 80%	 70%	▼

See the forest *and* the trees...

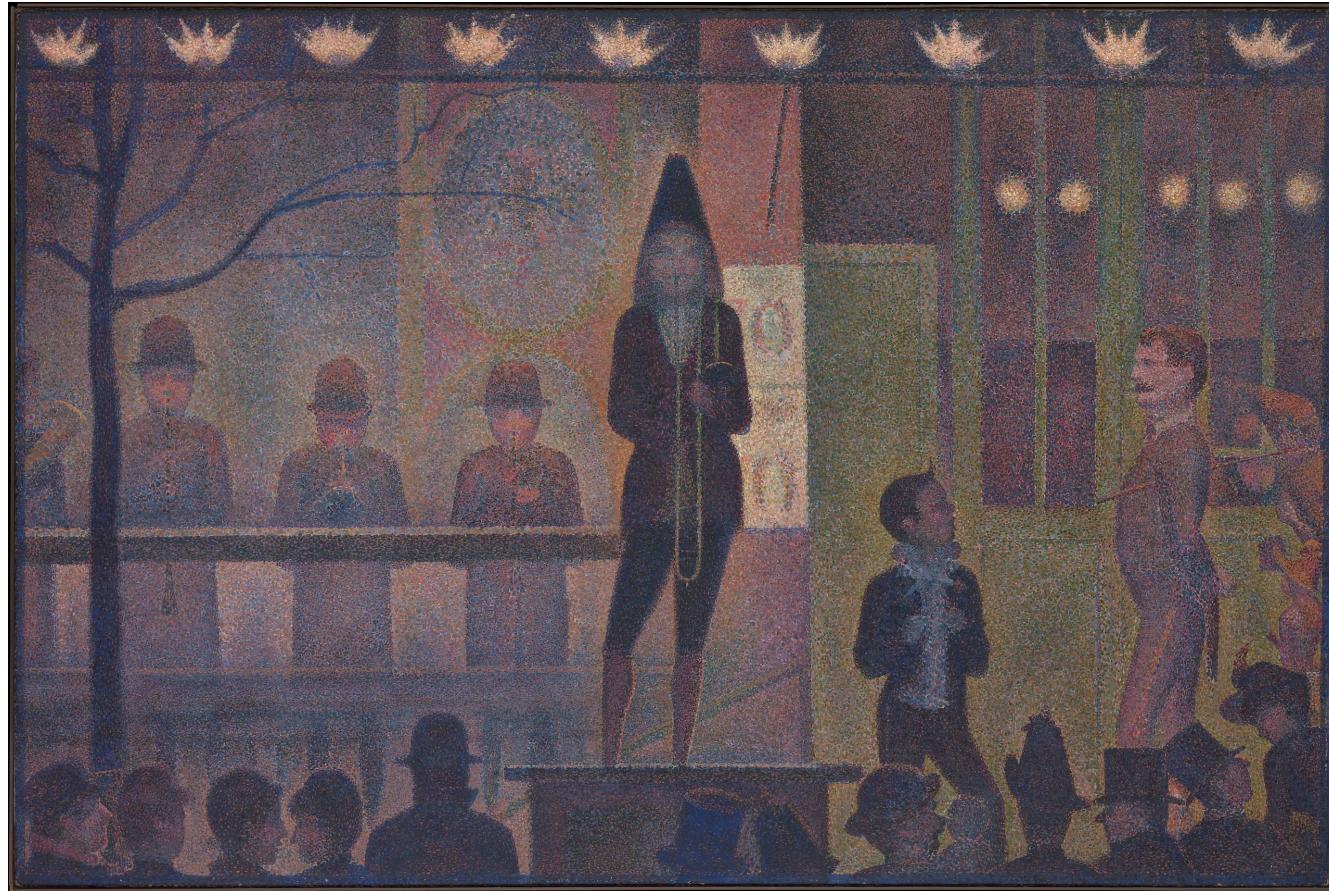


See the forest *and* the trees...



<https://www.principlegallery.com/technique-tuesday-pointillism-take-two/>

See the forest *and* the trees...



Georges Seurat, *Parade de Cirque*, 1887-88, Public domain, via Wikimedia Commons

See the forest *and* the trees...



Georges Seurat, *A Sunday Afternoon on the Island of La Grande Jatte*, 1884-86, Public domain, via Wikimedia Commons

Programming fundamentals

Consume input, Create output Ch 2: Intro to Python

Remember things

Ch 3 & 4: Variables, Expressions, Types, Strings, Lists, Sets, Tuples, Dictionaries

Calculate things

Make things happen in sequence Ch 2, 3, 4

Ask a question, decide what to do based on answer Ch 5: Branching

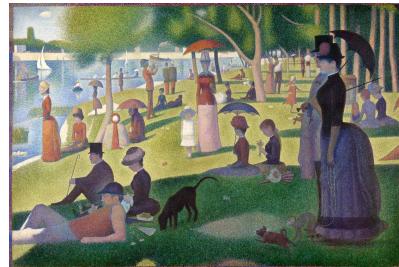
Make things happen repeatedly Ch 6: Loops



ENGR 1110: Introduction to Software Engineering

Multiple instructors
SPRING 2024

Chapter 5. Branching



5) Branching ^

- 5.1 If-else branches (general)
- 5.2 Detecting equal values with branches
- 5.3 Detecting ranges with branches (general)
- 5.4 Detecting ranges with branches
- 5.5 Detecting ranges using logical operators
- 5.6 Detecting ranges with gaps
- 5.7 Detecting multiple features with branches
- 5.8 Comparing data types and common errors
- 5.9 Membership & identity operators
- 5.10 Order of evaluation
- 5.11 Code blocks and indentation
- 5.12 Conditional expressions
- 5.13 Additional practice: Tweet decoder
- 5.14 LAB: Smallest number Lab
- 5.15 LAB: Interstate highway numbers** Lab



A blue rectangular banner with white text. At the top left is a large, stylized orange arrow pointing right. To its right, the text "ENGR 1110: Introduction to Software Engineering" is written in a large, white, sans-serif font. At the bottom left, the text "Multiple instructors SPRING 2024" is displayed in a smaller, white, sans-serif font. In the bottom right corner, there is a large, faint, stylized number "7".

Chapter 5. Branching

- 5) Branching ^
- 5.1 If-else branches (general)
 - 5.2 Detecting equal values with branches
 - 5.3 Detecting ranges with branches (general)
 - 5.4 Detecting ranges with branches
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 - 5.11 Code blocks and indentation
 - 5.12 Conditional expressions
 - 5.13 Additional practice: Tweet decoder
 - 5.14 LAB: Smallest number Lab
 - 5.15 LAB: Interstate highway numbers** Lab

Ch 5 Branching – Lab 5.15

5.15 LAB: Interstate highway numbers

Primary U.S. interstate highways are numbered 1-99. Odd numbers (like the 5 or 95) go north/south, and evens (like the 10 or 90) go east/west. Auxiliary highways are numbered 100-999, and service the primary highway indicated by the rightmost two digits. Thus, I-405 services I-5, and I-290 services I-90. Note: 200 is not a valid auxiliary highway because 00 is not a valid primary highway number.

Given a highway number, indicate whether it is a primary or auxiliary highway. If auxiliary, indicate what primary highway it serves. Also indicate if the (primary) highway runs north/south or east/west.

Ex: If the input is:

```
90
```

the output is:

```
I-90 is primary, going east/west.
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
```

```
# create the output
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
```

```
# create the output
print(f"{prefix}{hwy_num} is {kind}{serving}{direction}.")
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# create the output
print(f"{prefix}{hwy_num} is {kind}{serving}{direction}.")
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the kind of interstate highway

# create the output
print(f"{prefix}{hwy_num} is {kind}{serving}{direction}.")
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the kind of interstate highway

# set the direction of the highway

# create the output
print(f"{prefix}{hwy_num} is {kind}{serving}{direction}.")
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the kind of interstate highway

# set the direction of the highway

# calculate the primary highway for an auxiliary

# create the output
print(f"{prefix}{hwy_num} is {kind}{serving}{direction}.")
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the kind of interstate highway
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the kind of interstate highway

if the value of hwy_num is between 1 and 99
then kind should be "primary"
but if the value of hwy_num is between 100 and 999 and not a multiple of 100
then kind should be "auxiliary"
otherwise, kind should be "not a valid interstate highway number"
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the direction of the highway
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the direction of the highway

if kind is either "primary" or "auxiliary"
then we need to do the following:
    prefix should be "I-"
    if hwy_num is even
        then direction should be ", going east/west"
    otherwise, direction should be ", going north/south"
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# calculate the primary highway for an auxiliary
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# calculate the primary highway for an auxiliary

if kind is "auxiliary"
then serving should be ", serving I-" + str(hwy_num % 100)
```

Ch 5 Branching – Lab 5.15

```
hwy_num = int(input())
kind = ""
prefix = ""
serving = ""
direction= ""

# set the kind of interstate highway
if 1 <= hwy_num <= 99:
    kind = "primary"
elif (99 < hwy_num <= 999) and (1 <= (hwy_num % 100) <= 99):
    kind = "auxiliary"
else:
    kind ="not a valid interstate highway number"

# set the direction of the highway
if (kind == "primary") or (kind == "auxiliary"):
    prefix = "I-"
    if (hwy_num % 2 == 0):
        direction = ", going east/west"
    else:
        direction = ", going north/south"

# calculate the primary highway for an auxiliary
if (kind == "auxiliary"):
    serving = ", serving I-" + str(hwy_num %100)

# create the output
print(f"{prefix}{hwy_num} is {kind}{serving}{direction}.")
```