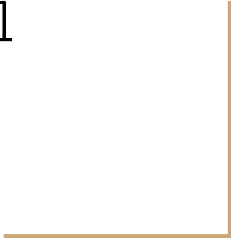


# Programming, Problem Solving, and Algorithms

CPSC203, 2019 W1



# Announcements

Lab this week is laptop setup: Anaconda's Python3 and PyCharm

"Problem of the Day" starts today!

## Today:

Color Representation

Problem Decomposition using Python Classes

POTD

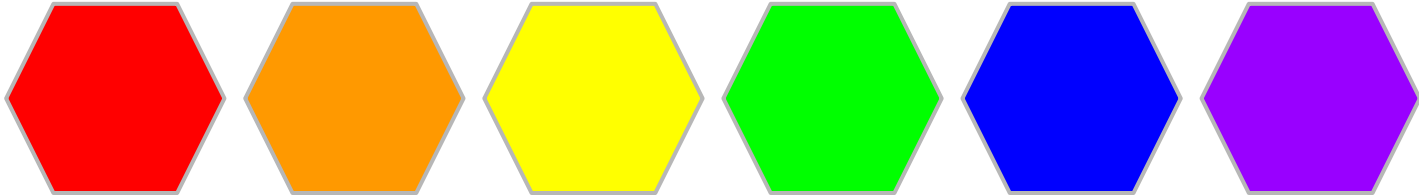
# Color Interpretation

What's your favorite color? Do you have a sense for *why* it's your favorite? Does that color influence your dress/decor/purchases?

Psychological: <http://www.playbuzz.com/jon10/what-color-matches-your-personality>

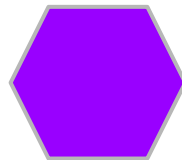
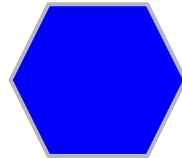
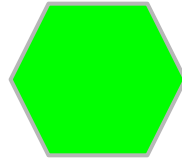
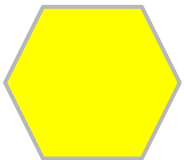
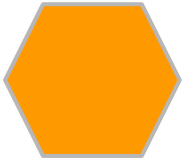
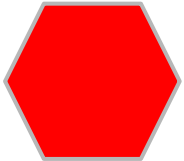
Cultural: <http://markedbydesign.net/blog/meaning-in-color/>

Activity - In pairs, choose a color (primary or secondary) and find something in its cultural symbolism that surprises you. Contradictions are especially interesting. Report your findings to the group (briefly).



# Color - Cultural Interpretation

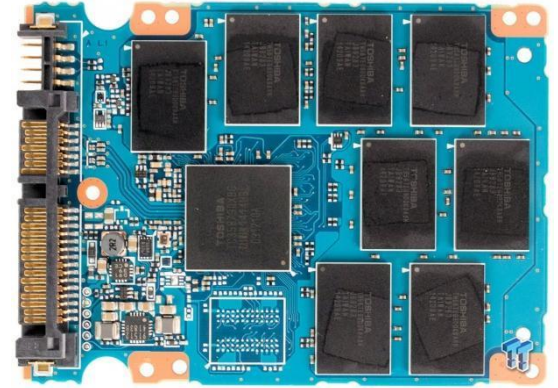
Activity - In pairs, choose a color (primary or secondary) and find something in its cultural symbolism that surprises you. Contradictions are especially interesting. Report your findings to the group (briefly).



# Color - Representation

First, some general questions...

What does data look like to a computer?



Is that enough?

# Color - Representation

Can we use bits to represent integers?

3	1	5	7
$10^3$	$10^2$	$10^1$	$10^0$

=

3	2	1	0

=

=

# Color - Representation

Can we use integers to represent colors?

RGB - (red, green, blue), where each "component" is in range 0 through 255.

ex. (255, 0, 127) == 

fun calculator for color values: <http://colorizer.org>

How many bits for 256 values?    3    4    5    6    7    8    9    10

# Color - Representation

RGB - (red, green, blue), where each “component” is in range 0 through 255.

How many bits for 256 values?    3    4    5    6    7    8    9    10

What color is

0 1 0 1 1 0 1 1 0 1 0 1 1 0 1 1 0 1 0 1 1 0 1 1

Easier to read if we use “hexadecimal” representation:

Each component is represented by 2 hex digits 0123456789abcdef

ex. #674ea7 ==





# Representation (aside)

What do you observe about the following rgb colors?

Red	Green	Blue
255	0	0
17	0	178
45	0	13
200	0	220
62	0	37
130	0	95

# Knitting

The language used to communicate patterns uses exactly the same fundamental constructs as Python!!

## Sherbet Stripes

*Notes:* Bright, delicious stripes, vertical on the front and horizontal on the reverse side, make this dishcloth a welcome addition to your kitchen. A simple 4 row repeat of slip stitches creates a fun color work effect that is deceptively simple to work but must be done on double pointed needles to allow you to knit from either end of the work.

Slip Stitch Pattern (worked over four rows)

Row 1 (RS): With CC, \*S11 WYIB, k1\*, repeat between \*s until 1 st remains, S11 WYIB.

Row 2 (WS): Slide the work to the other end of the needle and pick up MC to work. \*K1, S11 WYIB\*, repeat between \*s until 2 st remains, K1. Turn work.

Row 3: With CC, \*S11 WYIF, P1\*, repeat between \*s until 1 st remains, S11 WYIF.

Row 4: Slide the work to the other end of the needle and pick up MC to work. \*P1, S11 WYIF\*, repeat until 1 st remains, P1. Turn.

### DIRECTIONS

With MC, CO 33 sts.

K 1 row.

Begin Slip Stitch Pattern and work 11 rep of the 4 row rep. (44 rows of patt.)

Break CC yarn.

K 1 row in MC.

BO all sts.

### Finishing

Weave in ends, wash and block to dimensions.



### About the Designer

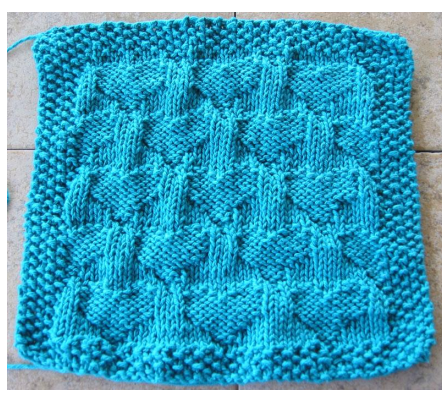
Gillian Wynne Grimm lives in a little white cottage on a tree lined street in Portland, Oregon where she knits, sews and generally enjoys making all manner of crafty and creative things.

Follow along with her adventures at [Birchhollowcottage.com](http://Birchhollowcottage.com).

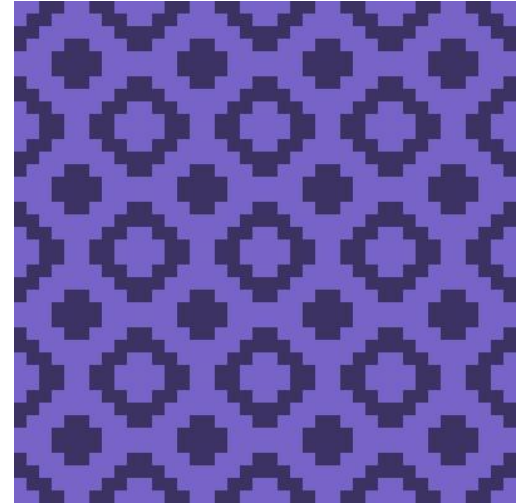
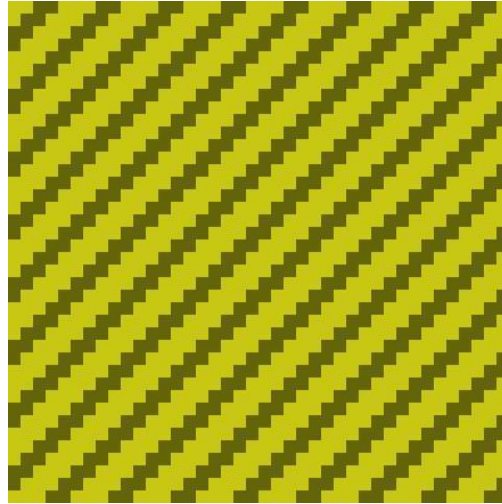
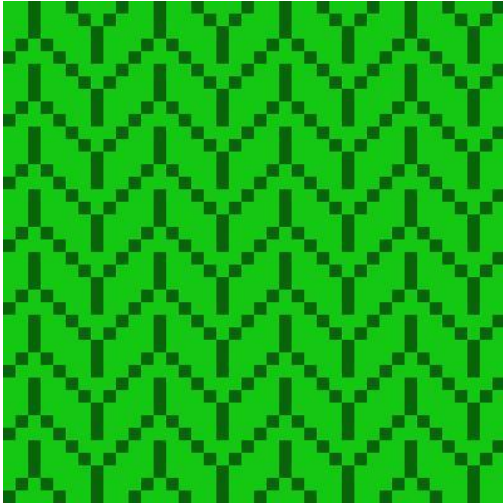
For pattern support, please contact [info@birchhollowcottage.com](mailto:info@birchhollowcottage.com)



# Knitting



# Program Design



A handcraft is a collection of \_\_\_\_\_, each of which has a \_\_\_\_\_.

Every \_\_\_\_\_ is a collection of rows. Every row is a collection of \_\_\_\_\_.

Every \_\_\_\_\_ is either "knit" or "purl."

# Classes in Python

Mechanism for creating user-defined types.

Used to identify attributes with an object.

Associates functionality with the relevant objects.

Ex:

```
8   @dataclass
9   class color:
10      """
11      color: simply gathers color components
12      """
13      • red: int = 120
14         green: int = 120
15         blue: int = 120
```

# Design Strategies

1. Decompose a problem into classes
2. List the data associated with each class
3. Write the “driver” code that illustrates the functionality you expect from each class.
4. Implement the functions you expect.
5. Run the driver code to test your functionality.

# Demo & Reflection

<https://repl.it/@ckh205/knittingSkeleton>

Review the code we've written and make 3 observations:

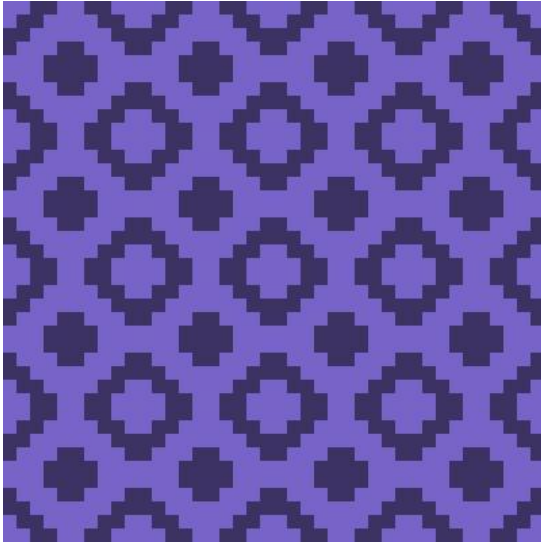
1. Line \_\_: \_\_\_\_\_
2. Line \_\_: \_\_\_\_\_
3. Line \_\_: \_\_\_\_\_

Was our decomposition necessary? Why not just use a 2d array of rectangles?

Abstraction/Encapsulation:

# Adding Functionality

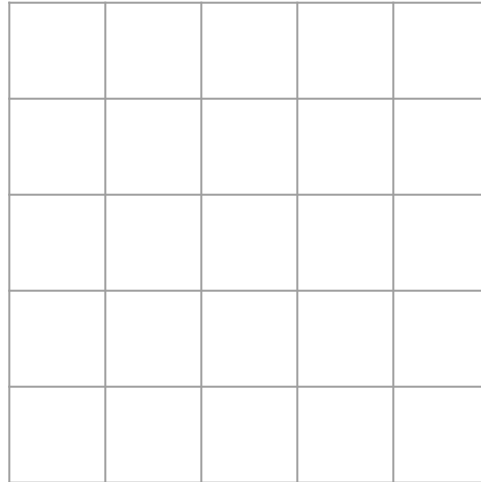
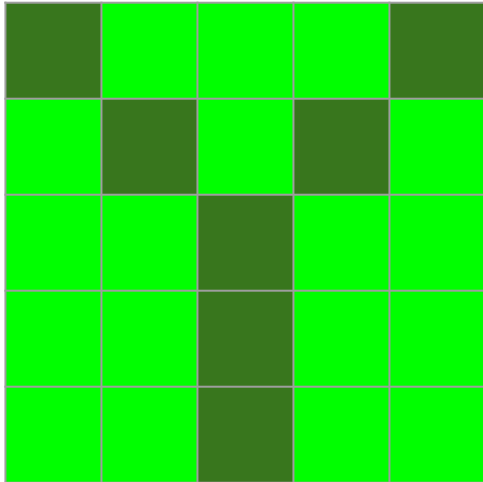
Creating blocks is an arduous task. We'd like a way to make new blocks out of old ones! How many different kinds of blocks are found in this image? How are they related to one another?





# Flip Vertical

Suppose we want to create a new block which is just the vertical reflection of a given block. Sketch the new block. Describe how you would accomplish the flipped block, in terms of the block representation in our code (list of rows).



1.

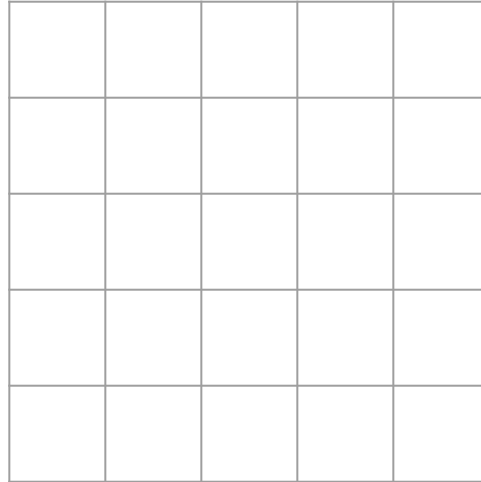
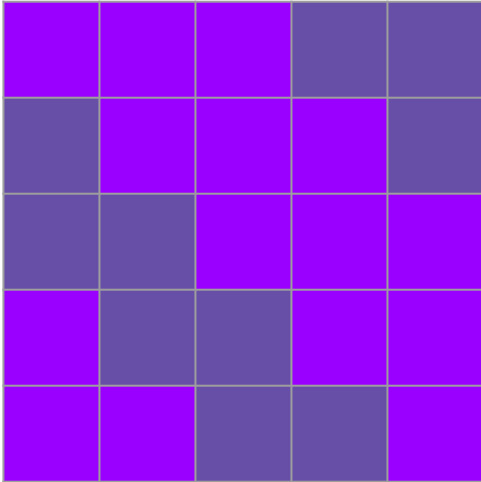
2.

3.

4.

# Flip Horizontal

Suppose we want to create a new block which is just the horizontal reflection of a given block. Sketch the new block. Describe how you would accomplish the flipped block, in terms of the block representation in our code.



1.

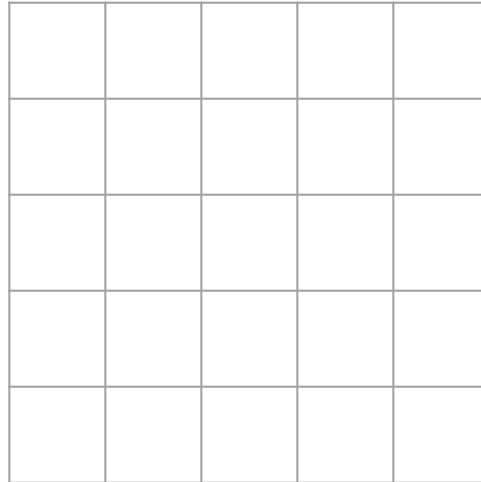
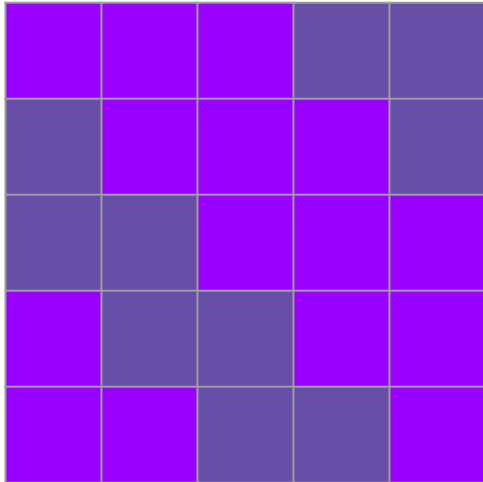
2.

3.

4.

# Rotate 180

Suppose we want to create a new block which is a 180 degree rotation of a given block. Sketch the new block. Describe how you would accomplish the flipped block.



1.

2.

3.

4.

# POTD #1 Tue

<https://repl.it/@ckh205/POTD01>

Describe any snags you run into:

1. Line \_\_\_: \_\_\_\_\_

2. Line \_\_\_: \_\_\_\_\_

3. Line \_\_\_: \_\_\_\_\_

4. Line \_\_\_: \_\_\_\_\_

5. Line \_\_\_: \_\_\_\_\_

# ToDo for next class...

POTD: Wed, Thu

Reading: TLACS Ch 4 (intro to turtle graphics and iteration)

Play: <https://www.google.com/search?q=color+picker>

Adapt: Use today's demo to create a handcraft of your own! Upload your creation to <https://bit.ly/2ly0z8Q> (please make unique file names)

References:

TLACS Ch 17

<https://docs.python.org/3/library/dataclasses.html>