Lab09 C flag (10.28.19) CS103 Fall 2019

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materials

- *lab09_19fa103.pdf* (this document)
- *lab09_19fa103.py*
- linear_interpolation.py

maritime flags https://en.wikipedia.org/wiki/International_maritime_signal_flags

purpose

- explore linear interpolation
- explore flag design
- explore turtle graphics
- explore randomization

about linear interpolation

- see slide on linear interpolation from lecture18 and linear_interpolation.py

line segment $(1-t)P+tQ$, $t \in [0,1]$
line $(1-t)P+tQ$, $t \in [-\infty,\infty]$
P $(1-t)P+tQ$ for $t=0$
Q $(1-t)P+tQ$ for $t=1$
midpoint of PQ $(1-t)P+tQ$ for $t=.5$
where is this point? $(1-t)P+tQ$ for $t=1/3$? $t=2$? $t=-1/3$?

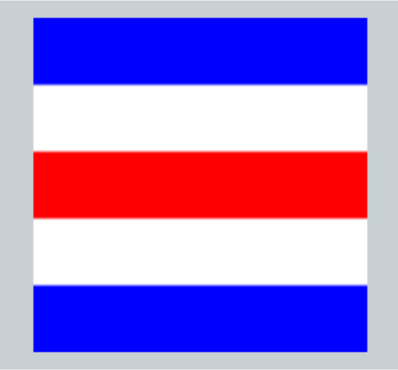

Figure 1: C flag

in-class exercises

1. given the bottom left corner of a rectilinear square of width w, find the top right corner
2. given 2 points P and Q, find a point between them using linear interpolation,
   say 1/3 of the distance between P and Q
3. how could you think of the C flag in terms of lines?
4. how could you think of the C flag in terms of rectangles?

thought exercises

1. given a bottom left corner of a rectilinear square of width w, find the top right corner
2. given 2 points P and Q, find a point between them using linear interpolation,
   say 1/3 of the distance between P and Q
3. how could you think of the C flag in terms of lines?
4. how could you think of the C flag in terms of rectangles?
5. are any of these rectangles redundant, because of the background colour of a turtle screen?
6. think of another algorithm to draw the C flag, by first replacing the default white background by a blue background

coding exercises

- write a function to build a list of the corners of a C flag (cCorners)
- write a function to draw the middle red rectangle of the C flag (middleRed)
- write a function to draw a C flag, given its location and size (cFlag)
- write a function to draw a random C flag (randomC)
- write a function to draw a filled triangle (triangle)

challenges

- develop an algorithm to draw the X flag
- develop an algorithm to draw the N flag
- write a function to draw a regular polygon (regular)
- draw 256 circles of varying intensity of red from 0 to 255 as 16 rows of 16 dots. Can you tell the difference between neighbouring circles? Which differences seem larger? (The blue and green part of the RGB triples should be 0, so RGB triples are (i,0,0) for i=0 to 255. You can set the color using RGB triples rather than strings like ‘red’ using colormode(255).)

deliverables

A+: A exercises + 256-circles
A: attendance, cFlag, randomC
B: attendance, precise and concise answers to in-class exercises (as comments in python script)
C: attendance