Exercise

1. On graph paper, make a box 4 pixels wide by 7 tall.
   • Color the boxes as follows, left to right: empty, full, full, empty; full, empty, empty, full; full, empty, empty, empty; empty, full, full, empty; empty, empty, empty, full; full, empty, empty, full; empty, full, full, empty.

2. Make another box the same size, and draw in it:
   • A half circle (top only), radius 2, with center at (2,2)*
   • A half circle (bottom only), radius 2, with center at (2,5)*
   • A line from (0,2) to (0,5)

*If you don’t have graph paper, make your own 4x7 set of boxes*
*measured right and down from top left*
Happy Rally Day!
Line Art

Eleni
Your Questions

Q. When should we use vector instead of raster in real life?
A. Vector graphics are used in a few niche applications, usually where arbitrary resizing is important. Character font definitions often use vector descriptions.
Your Questions

Q. I am wondering vector graphics provides a model for raster graphics, and some raster graphics are produced by vector graphics? And how we define colors for vector graphics?

Q. Are vector graphics more commonly seen in machine designing?

Q. Are layers considered vector? Also, does the cut feature in painting programs run on vector mode? Because the textbook says that vector objects can be edited, but so could the cut objects in painting programs. In the texts, vector displays are faster, but what if there are a lot of shapes in the picture? Are vector displays always faster? I also don't understand the grayscale system. Does it on show different shades of grey? Also, JPEG uses full color images, what is that? Why is RGB system based in red, green, and blue?
Q. I am a little confused about the "file format P3" that was mentioned in the example... not sure what P3 is and why it is a file format

A. You’re right, it is a bit mysterious. Many files begin with a so-called “magic number” or code unique to that file type. P3 is the magic number for the PPM file format. Here are some others:

• GIF image files begin with the ASCII code for "GIF89a" or "GIF87a"
• JPEG image files begin with \x{FF D8} and end with \x{FF D9}.
• PNG image files begin with an 8-byte signature: \x{211 PNG \r \n \032 \n}
Your Questions

Q. Why do programs such as the one we're using start at the upper left corner instead of the center or the lower right hand corner?

A. I’m not sure actually.

It’s probably because on old CRT screens the raster scan began at the top and moved downwards. This means that the top left pixel is stored first in memory.

There’s a discussion of this topic here: https://gamedev.stackexchange.com/questions/83570/why-is-the-origin-in-computer-graphics-coordinates-at-the-top-left#:%7E:text=Because%20screens%20start%20rendering%20the,axis%20going%20into%20the%20screen.
&text=Red%20arrow%20would%20be%20upside,NOT%20use%20top%2Dleft%20origin.
Q. For the pixel center, if the coordinates start at 0, 0 for the top left pixel, how do you reach the top left corner of that first pixel?

A. (-0.5, -0.5)

Q. In the PCO, does that mean the length and the width stretches from the center of the top left to the center of the bottom right? So it's like off a half pixel smaller rectangle.

A. *The height and width are unaffected.*

Q. Why is the center -0.5 rather than +0.5 when considering corner origin?

*In corner origin, the center of the first pixel is (0.5,0.5).*
Your Questions

Q. Does the center of a graphics window always land on a border?

Q. I was confused because I felt like my answers for Q2 and Q3 contradicted each other - Corner Origin is supposed to be the only one with fractions in the center, but using PCO, Q2 has fractions in the center's coordinates?

A. The trick is that the nature of the center point changes depending on whether the number of pixels is even or odd.
Q. Since the HTML canvas element isn't defined until the body but there's no error for using it in the script, does this mean that HTML and JavaScript run non-chronologically?

A. It’s a bit complicated.

• The script is processed in the order in which it appears
• Functions are defined but not yet invoked
• Next, the HTML elements are read in and created
• After the entire file is processed, the `onload` event fires.
• It calls the `init()` function, which then calls `draw()`
Your Questions

Q. Where do we import Graphics? Or we just use it directly?
A. graphics is an object, not a package. The canvas.getContext("2d") call returns it.

Q. I'm still a bit confused how "theCanvas" works?
A. Javascript needs a way to connect to the objects created in the HTML portion of the page. "theCanvas" is a label attached to the HTML canvas object, so that the script can identify it.
More Questions?
Lab: Checkerboard

Icebreaker: When was the last time you attended a live music show?
First Homework!

• Start early!
• Line drawing video will post this evening
• Implement line drawing algorithm
• Importance of testing
Pair-programming

- Option on *some* assignments (Homework 1 included)
  - Will always specify explicitly if allowed
- Work on the code only together (one person shouldn’t go ahead and then “catch the other person up”)
  - If your schedules don’t match, pick another partner
- Switch “driver” every 20-30 min
  - Other partner supervises, checks for errors, etc.
- Consider repl.it “multiplayer” mode for collaboration