Brack Turner
CS 411
Hm 1

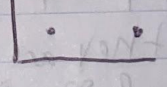
a. $(1,2) = (x_0, y_0)$
$(3,4) = (x_1, y_1)$

$\Delta x \quad x_1 - x_0 = 2$
$\Delta y \quad y_1 - y_0 = 2$

$P_K = 2\Delta y - \Delta x = 4 - 2 = 2$

b. $(1,1)\ (2,3)\ (3,1)$ vertices

$(1,1) = (x_0, y_0)$
$(2,3) = (x_1, y_1)$

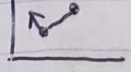


$m = \frac{2}{1} = 2 \quad y = 2x + b \quad b = y - 2x$

$b = (1) - 2(1) = -1 \quad y = 2 \quad x = \frac{y-b}{m} = \frac{3}{2}$

$(\frac{3}{2}, 2)$ point

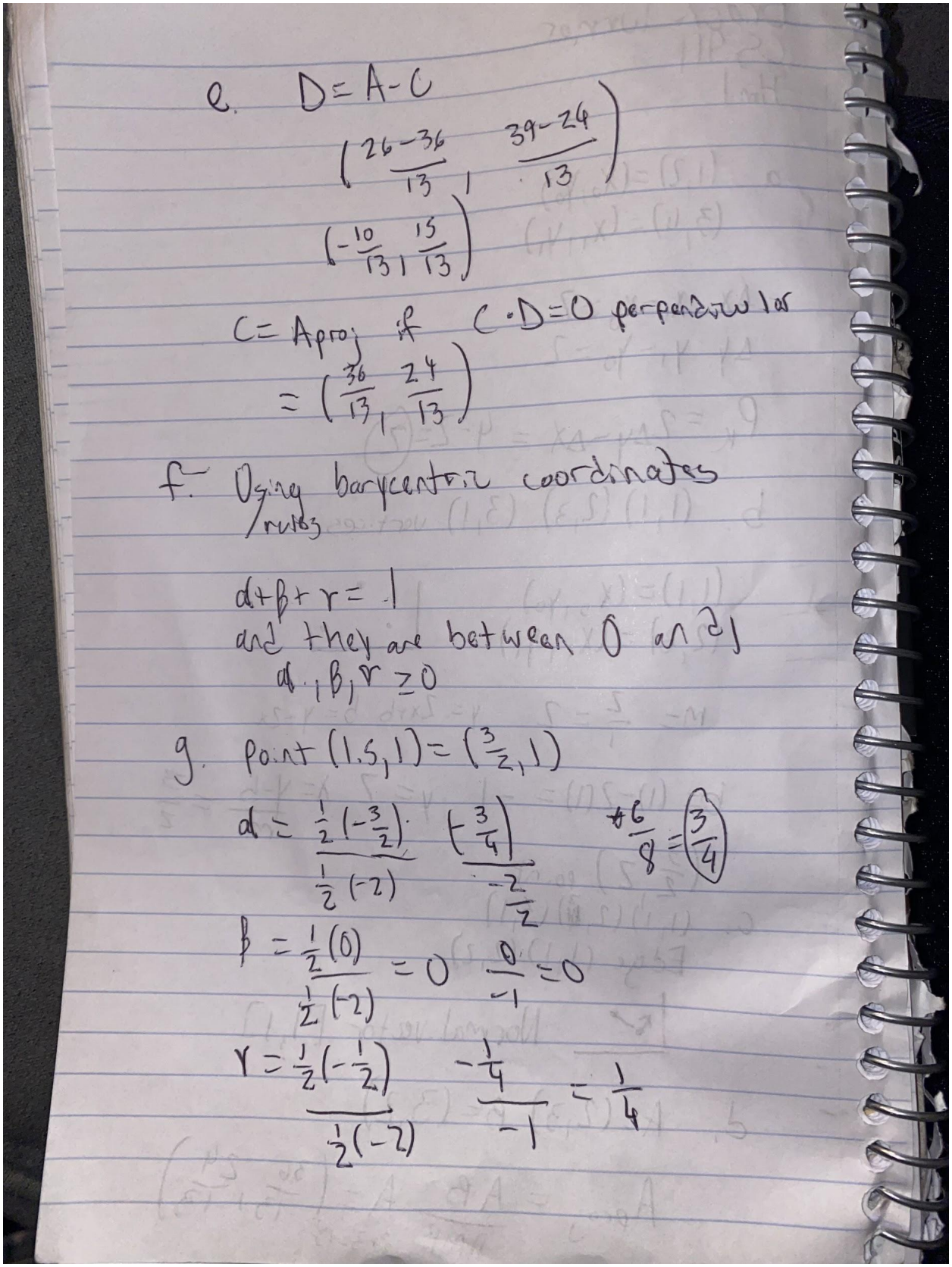
c. $(1,1)(2,3)(3,1)$
Edge $(1,1)(2,2)$



Normal vector $[1,1]$

d. $A = (2,3) \quad B = (3,2)$

$A_{proj} = \frac{AB}{\|A\|^2} \cdot A = \left(\frac{36}{13}, \frac{24}{13}\right)$ $\quad 2^2 + 3^2 = 13$



e. $D = A - C$

$\left(\frac{26-36}{13}, \frac{39-24}{13}\right)$

$\left(-\frac{10}{13}, \frac{15}{13}\right)$

$C = \text{Aproj}$ if $C \cdot D = 0$ perpendicular

$= \left(\frac{36}{13}, \frac{24}{13}\right)$

f. Using barycentric coordinates rules

$\alpha + \beta + \gamma = 1$

and they are between 0 and 1

$\alpha, \beta, \gamma \geq 0$

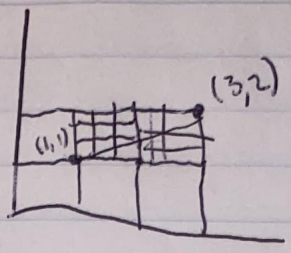
g. point $(1.5, 1) = \left(\frac{3}{2}, 1\right)$

$\alpha = \frac{\frac{1}{2}\left(-\frac{3}{2}\right)}{\frac{1}{2}(-2)} \quad \frac{\left(-\frac{3}{4}\right)}{-\frac{2}{2}}$ #6 $\frac{3}{4}$

$\beta = \frac{\frac{1}{2}(0)}{\frac{1}{2}(-2)} = 0 \quad \frac{0}{-1} = 0$

$\gamma = \frac{\frac{1}{2}\left(-\frac{1}{2}\right)}{\frac{1}{2}(-2)} \quad \frac{-\frac{1}{4}}{-1} = \frac{1}{4}$

h;



2 subpixels at (2,1)

i Convolution filter = $\begin{bmatrix} \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\ \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\ \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \end{bmatrix}$

$2[cf] = \begin{bmatrix} \frac{2}{9} & \frac{2}{9} & \frac{2}{9} \\ \frac{2}{9} & \frac{2}{9} & \frac{2}{9} \\ \frac{2}{9} & \frac{2}{9} & \frac{2}{9} \end{bmatrix}$ $9(2/9) = 18/9 = (2)$

j

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One of the first problems I had when trying to run the program was the speed in which the random functions would draw shapes and lines. I realized that my declarations for imageData accidentally had imageData.data instead of their respective imageData.height/width. The Bressenham's line would generate slowly. I made the same mistake as well with drawing triangles which actually caused the program to completely freeze because it was not able to correctly represent the image data.

When changing the fillmode was added, I tried adding it as a separate function. However I'd rather pass the color argument in drawTriangleLine instead of calling another function within. I also changed the toggle buttons to booleans that evaluate true or false; and changed the html file for fillMode button accordingly.