Day 20 1/1
cs4620 Sp21

Is $(1.2, 1.7)$ in triangle $i=(1,1)$, $j=(2,1)$, $k=(1,2)$

1 Find the normalized tangents

L_1 $\frac{j-i}{|j-i|} \Rightarrow \frac{(1,0)}{1} \Rightarrow (1,0)$

L_2 $\frac{k-j}{|k-j|} \Rightarrow \frac{(-1,1)}{\sqrt{2}} \Rightarrow \left(\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

L_3 $\frac{i-k}{|i-k|} \Rightarrow \frac{(0,-1)}{1} \Rightarrow (0,-1)$

Find orthogonal vector

$(0,1)$

$\left(-\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

$(1,0)$

3 Find C

$C = -Ax - By$

$C_1 = 0 \cdot 1 - 1 \cdot 1 = -1 \Rightarrow 0x + 1 \cdot y - 1 = 0$

$C_2 = \frac{1}{\sqrt{2}} \cdot 2 + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}} \Rightarrow -\frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y + \frac{3}{\sqrt{2}} = 0$

$C_3 = -1 \cdot 1 + 0 \cdot 2 = -1 \Rightarrow 1x + 0y - 1 = 0$

Plug in the point $(1.2, 1.7)$

$0 \cdot 1.2 + 1 \cdot 1.7 - 1 = .7$

$\frac{-1.2}{\sqrt{2}} - \frac{1.7}{\sqrt{2}} + \frac{3}{\sqrt{2}} = \frac{.1}{\sqrt{2}}$

$1 \cdot 1.2 + 0 \cdot 1.7 - 1 = .2$

↓

Point is inside