GNG 1106 A LAB (6)

Assignment 1 : Compute the area of a triangle given by the coordinates of its three vertices

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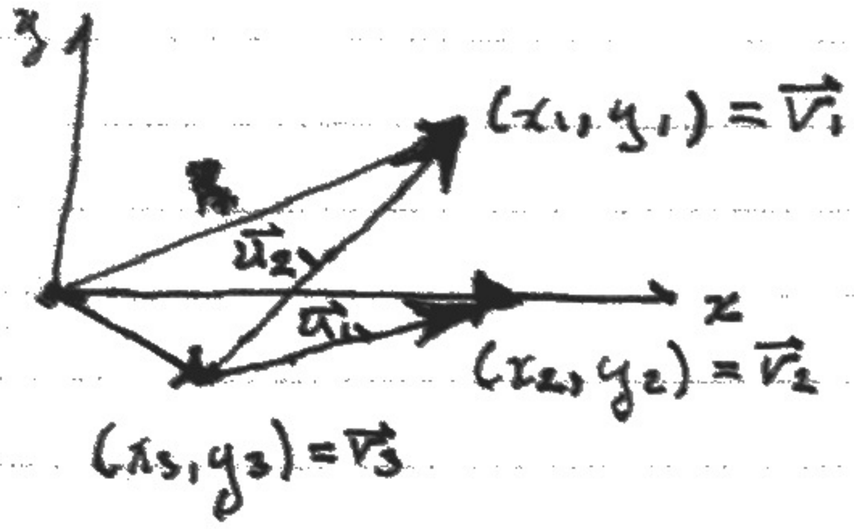
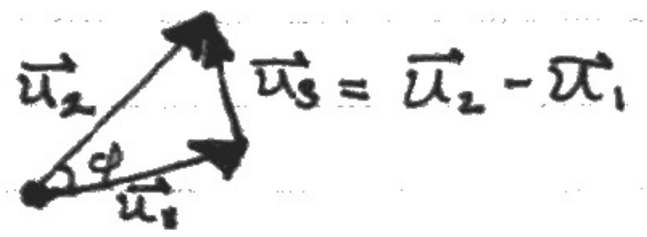
Due : 26/09/2014

The purpose of this program is to compute the area of a triangle given the components of three vectors.





$$\vec{u}_1 = \vec{v}_2 - \vec{v}_3 = \langle (x_2 - x_3), (y_2 - y_3) \rangle$$

$$\vec{u}_2 = \vec{v}_1 - \vec{v}_3 = \langle (x_1 - x_3), (y_1 - y_3) \rangle$$

$$\vec{u}_3 = \vec{u}_2 - \vec{u}_1$$

$A_\Delta \equiv$ Area of triangle

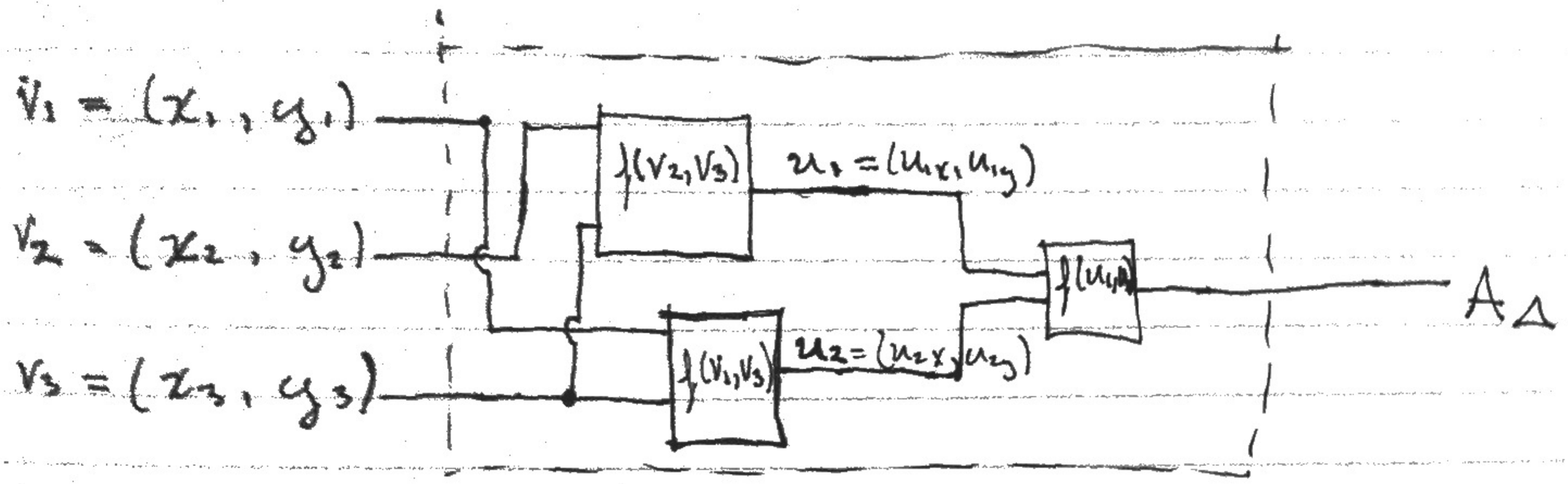
$$= \|\vec{u}_1\| \cdot \|\vec{u}_2\| \sin \varphi / 2$$

$$= \|\vec{u}_1 \times \vec{u}_2\| / 2$$

$$= \| \det(\vec{u}_1, \vec{u}_2) \| / 2$$

$$\det(\vec{u}_1, \vec{u}_2) = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ u_{1x} & u_{1y} & u_{1z} \\ u_{2x} & u_{2y} & u_{2z} \end{vmatrix}_{\substack{u_{1z}=0 \\ u_{2z}=0}} = (u_{1x} \cdot u_{2y} - u_{2x} \cdot u_{1y}) \hat{k}$$

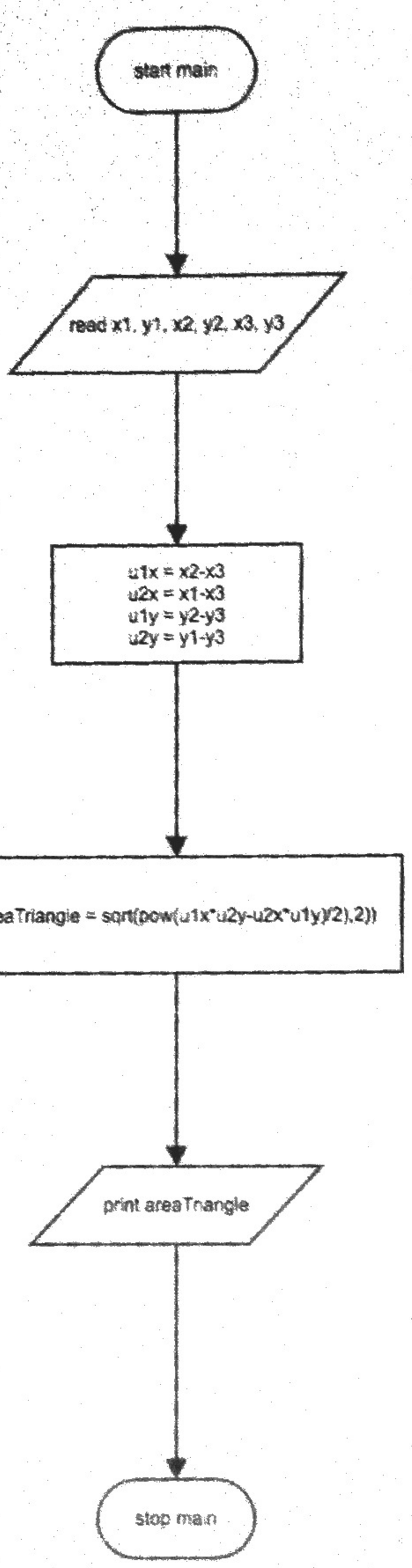
$$\| \det(\vec{u}_1, \vec{u}_2) \| = \left| u_{1x} \cdot u_{2y} - u_{2x} \cdot u_{1y} \right|$$

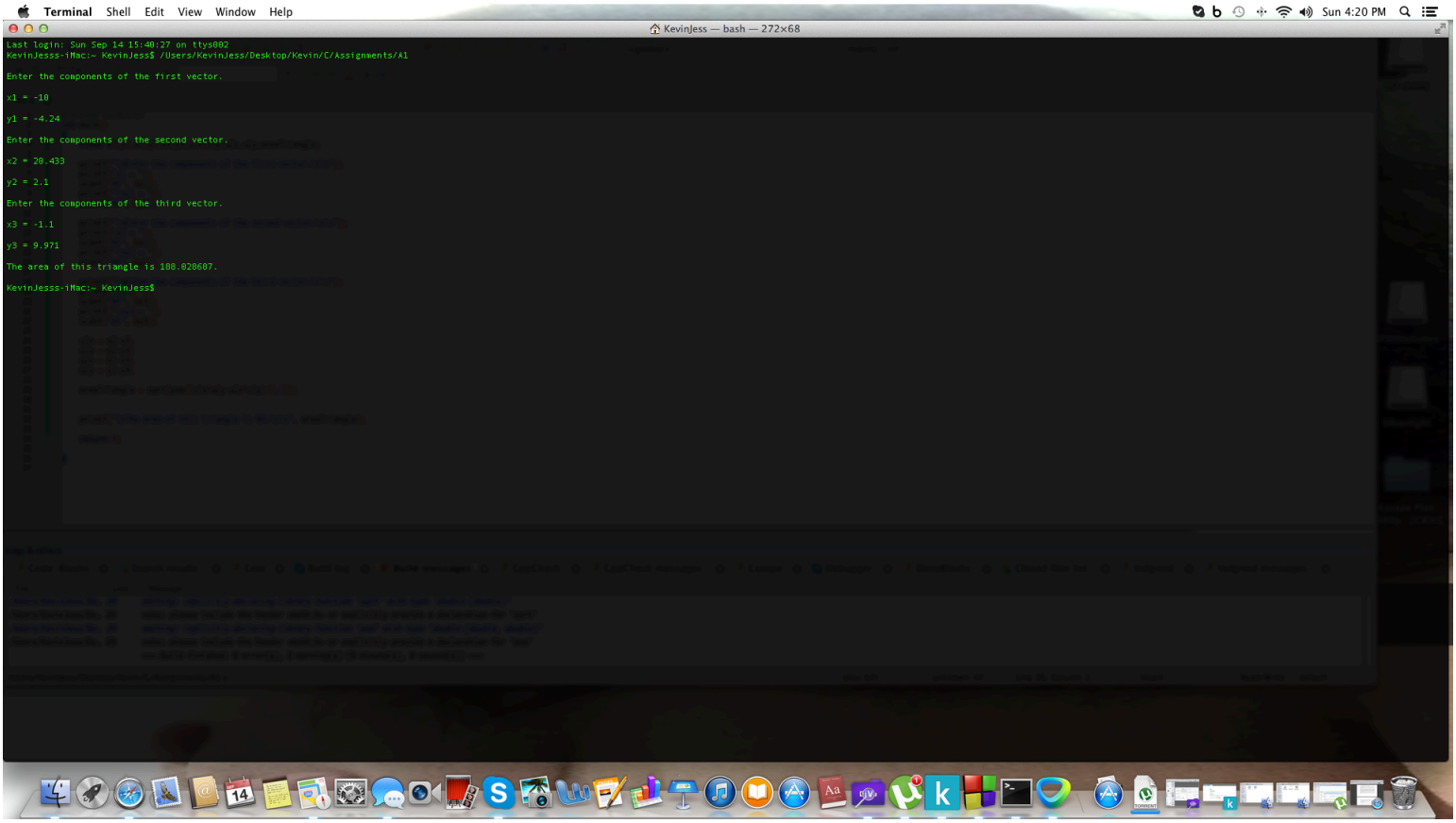


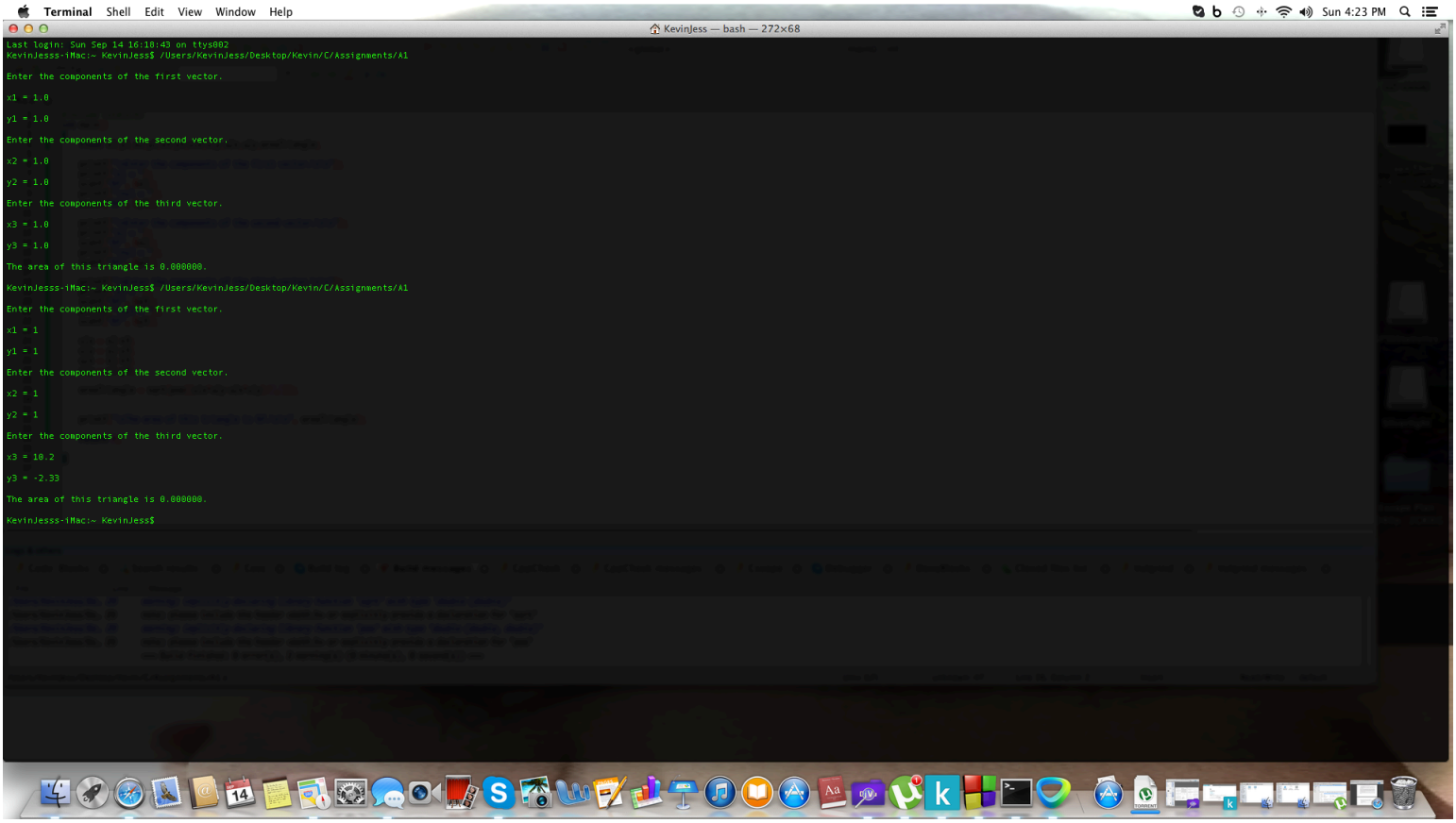
$f(V_2, V_3) = \{(x_2 - x_3), (y_2 - y_3)\}$

$f(V_1, V_3) = \{(x_1 - x_3), (y_1 - y_3)\}$

$f(u_1, u_2) = \dfrac{(u_{1x} \cdot u_{2y} - u_{2x} - u_{1y})}{2} = A\Delta$


start main
read x1, y1, x2, y2, x3, y3
u1x = x2-x3
u2x = x1-x3
u1y = y2-y3
u2y = y1-y3
areaTriangle = sqrt(pow(u1x*u2y-u2x*u1y)/2),2))
print areaTriangle
stop main


Terminal Shell Edit View Window Help
Sun 4:20 PM
KevinJess — bash — 272×68
Last login: Sun Sep 14 15:40:27 on ttys002
KevinJesss-iMac:~ KevinJess$ /Users/KevinJess/Desktop/Kevin/C/Assignments/A1
Enter the components of the first vector.
x1 = -10
y1 = -4.24
Enter the components of the second vector.
x2 = 20.433
y2 = 2.1
Enter the components of the third vector.
x3 = -1.1
y3 = 9.971
The area of this triangle is 188.020607.
KevinJesss-iMac:~ KevinJess$


Terminal Shell Edit View Window Help
Sun 4:23 PM
KevinJess — bash — 272×68
Last login: Sun Sep 14 16:18:43 on ttys002
KevinJesss-iMac:~ KevinJess$ /Users/KevinJess/Desktop/Kevin/C/Assignments/A1
Enter the components of the first vector.
x1 = 1.0
y1 = 1.0
Enter the components of the second vector.
x2 = 1.0
y2 = 1.0
Enter the components of the third vector.
x3 = 1.0
y3 = 1.0
The area of this triangle is 0.000000.
KevinJesss-iMac:~ KevinJess$ /Users/KevinJess/Desktop/Kevin/C/Assignments/A1
Enter the components of the first vector.
x1 = 1
y1 = 1
Enter the components of the second vector.
x2 = 1
y2 = 1
Enter the components of the third vector.
x3 = 10.2
y3 = -2.33
The area of this triangle is 0.000000.
KevinJesss-iMac:~ KevinJess$