Subject of Experiment: OpenGL window and simple drawing

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PROBLEM:

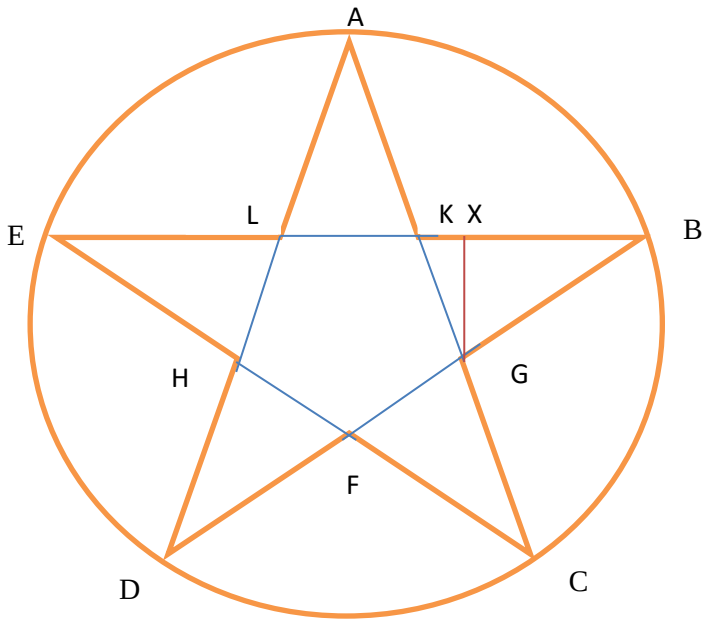
In this experiment what expected from us is draw a white pentacle on red backround using OpenGL.

SOLUTION:

I started with downloading Visual Studio. First I display an 512x512 window with red backround. After that I downloaded InitShader for introduce shaders to the program. InitShader requires Angel.h and Angel.h requires mat.h and vec.h so I downloaded all of them.

For create a five-point star, I decided to draw 3 triangle that all of center is the center of the window, in other words (0,0) point of coordinate system. I write triangles coordinates in vec2 and I define them constant. Then I send them to buffer and draw it using `glDrawArrays()` function.

When I draw triangles, I need to points of the triangles. I calculate them using sinus and cosinus function. I presumed that star covered by a circle. Every triangle is isosceles and their angle is 36-36-108. I started to calculate other angles from rules of isosceles triangle. I assumed origin point is at the center of the triangles and it make easier to find coordinates of points and radius of cycle is r. Detailed calculations are below.

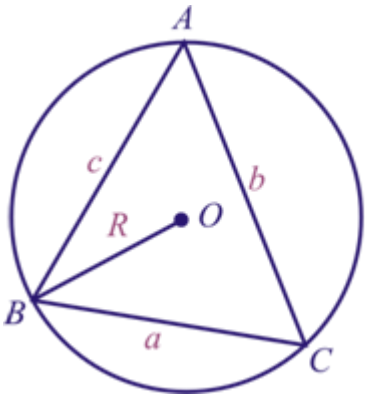


First triangle: (EFB) triangle. Its coordinates are in below:

E(-r*cos18, r*sin18)

B(r*cos18, r*sin18)

When I calculate F point's y-axis value, I create a little triagle which its hypotenuse will be a. Then I used sinus theorem.



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

r/sin(126)=a/sin(18) => a= sin(18)/sin(126)*r

F(0.0, -a)

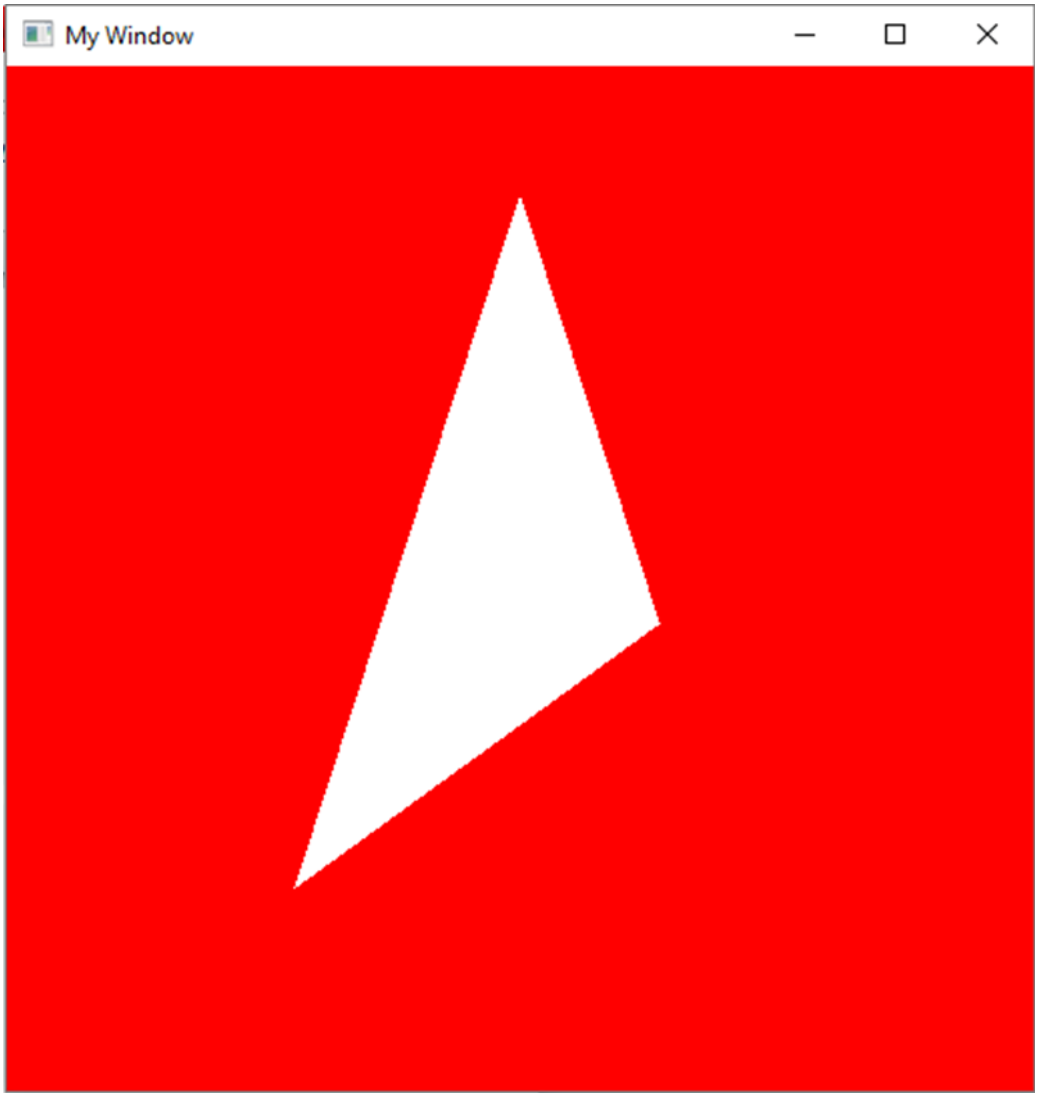
Second triangle: (ADG) triangle. Its coordinates are in below:

A(0.0, r)

D(-r*sin(36), -r*cos(36))

I found pentagon's one edge 2*a*sin(36) by draw a vertical triangle to the edge of above the center of the circle. I define hypotenuse as 'a' and did sinus and cosinus math on this edge. So I found K point's coordinates as (a*sin(36), r*sin(18)). Then I made another triangle(KXG). I know the length of hypotenuse KG, so again I did sinus cosinus math on this triangle. I add K point to KX length for find its x-axis magnitude and I subtract the length of GX from K point's y. So, I calculate G point's coordinates.

G(-(a*sin36+2*a*sin36*sin18), r*sin18 - 2 * a*sin36*sin72)



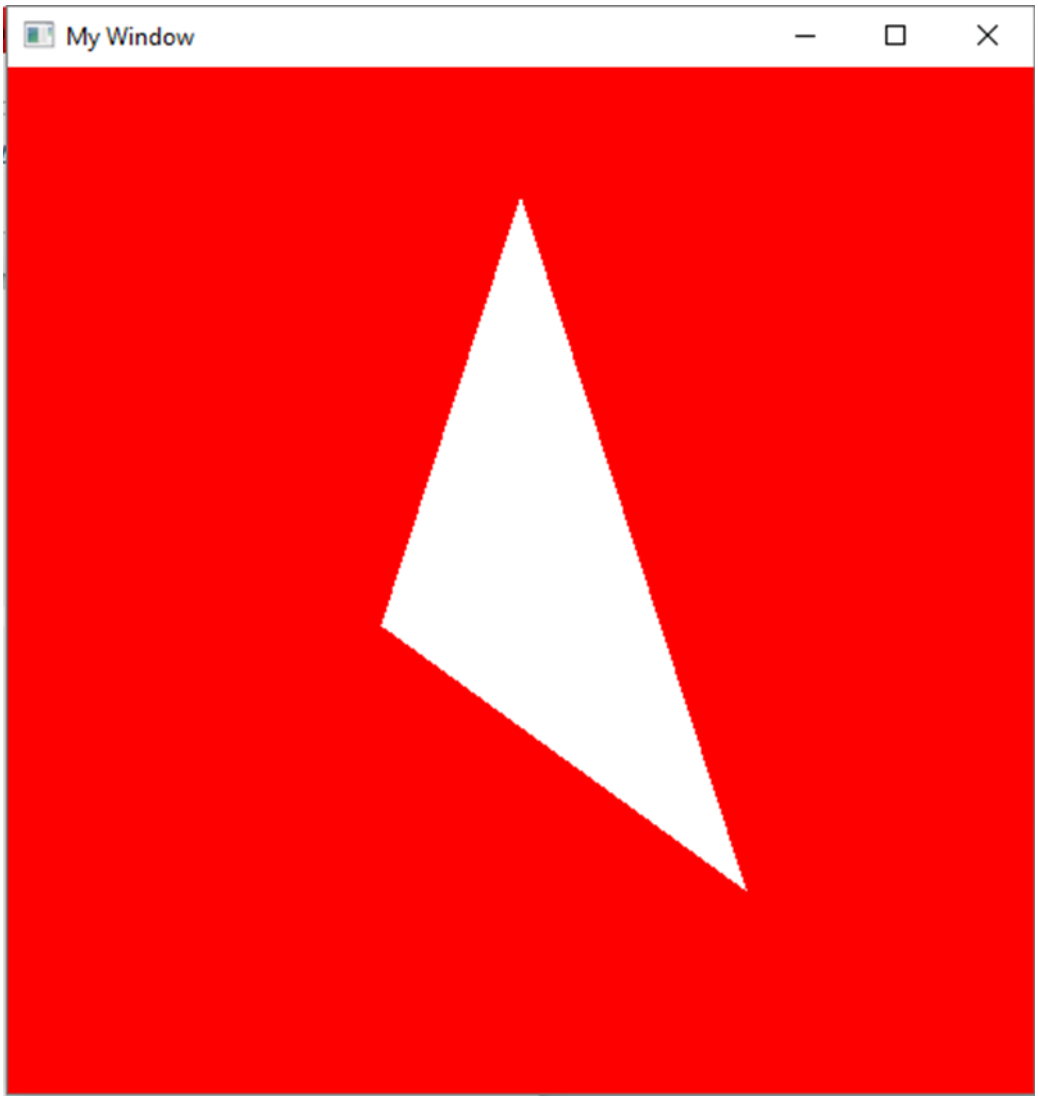
Third triangle: (ACH) triangle. Its coordinates are in below:

A(0.0, r)

C(r*sin(36), -r*cos(36))

G and H point is symmetry with respect to y axis, so;

H((a*sin36+2*a*sin36*sin18), r*sin18 - 2 * a*sin36*sin72)



I merged the triangles and this view is result of my homework.

REFERENCES:

https://www.cs.unm.edu/~angel/BOOK/INTERACTIVE_COMPUTER_GRAPHICS/SIXTH_EDITION/CODE/Common/InitShader.cpp

https://www.cs.unm.edu/~angel/BOOK/INTERACTIVE_COMPUTER_GRAPHICS/SIXTH_EDITION/CODE/include/Angel.h

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https://github.com/okaram/opengl/blob/master/book/include/mat.h

http://www.opengl-tutorial.org/beginners-tutorials/tutorial-2-the-first-triangle/