**Creating a Star in Mathematica**

Recall that we generate a regular polygon by creating a list of unit vectors at angles 2 Pi/n, 4 Pi/n, … 2 Pi. For example, if n = 8, our list consists of the vectors with angles depicted below:



If we connect these points in order via the **Polygon** command, we get the regular closed and filled-in octagon shown below:



The angles of the vertices are, in order, **Table[i,{i,2Pi/8, 2Pi, 2Pi/8}]**, which evaluates to:



If we multiply these angles by *any* integer, we will always get the same angles back (perhaps not all of them) but in a different order. For example:







(see next figure). If we now connect the vectors at these angles by the usual **Polygon** command *in the order they are now listed*, we get a nice star:



Thus, to generate regular stars, we need the following three functions:

1. Define a function that creates a unit vector with the given angle

* Name: UnitVectorAtAngle
* Input: t (angle)
* Result: unit vector with the given angle (we have already created this function somewhere (I think)

2. Define a function that creates a list of n unit vectors with angles 2 Pi / n but shifts their order by listing every kth angle

* Name: StarVectorList
* Input: n (number of vertices of polygon), k (the number to shift the order by)
* Result: a list of n vectors forming a regular n polygon, listing every k-th vector in that new order

3. Define a function that creates and draws a polygon made out of a list of points

* Name: DrawPolygon
* Input: list (of points to draw)
* Result: image of polygon

With these function in place, we should be able to generate stars like this:

DrawPolygon[StarVectorList[8, 3]]

DrawPolygon[StarVectorList[8, 5]]

DrawPolygon[StarVectorList[22, 7]]

DrawPolygon[StarVectorList[23, 2]]

**Homework:**

1. Implement these functions to generate the stars above.
2. Use the StarVectorList function in your code to animate a regular polygon and animate your star instead
3. What happens if you execute DrawPolygon[StarVectorList[8, 4]] or DrawPolygon[StarVectorList[8, 2]]. Explain.