Question 1:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Edges	2	0	2	0	3	3	2	4	2	2	4	2	2	2	0	1	1	2	2	3	2	2	2	4	3	2
T's	2	1	0	0	1	1	0	2	0	0	2	0	0	0	0	1	1	2	0	1	0	0	0	4	1	0

Question 2:

a) Find a circle shape.
b) Not effected.
c) Shapes calculation:

Circle: Square: Hexagon:

$$\frac{4\pi^2 a^2}{(2\pi a)^2}=1 \qquad \frac{4\pi a^2}{(4a)^2}=\frac{\pi}{4} \qquad \frac{4\pi\frac{3\sqrt{3}}{2}a^2}{(6a)^2}=\frac{\sqrt{3}\pi}{6}$$

Doesnt assist in distinguishing polygons.

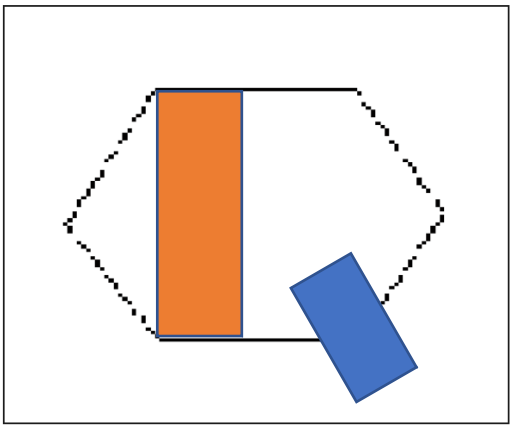
Question 3:

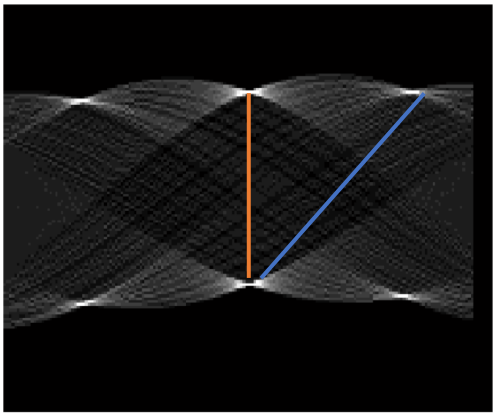
Question 4:

If the image would move or rotate or change sizes, than the property would change and therefore be irrelevant.

Question 5:

a) If the square will shift +45 degrees then all the maximum points will move 45 degrees right on the Angle axis.
b) If We will draw a line between 2 maximums points, this line will fit to a Filling of the two lines, in the original picture, starting from the crossing point and its width is up to its value.
Example:





Question 6:

a) Yes, in fact for these 2 pictures we can only use M_{00}. Because it's a binary image we will get the Area of the two shapes which is clearly different.
b) For shapes with Symmetry to their center only M_{00} will be valid, the rest will be zeroed. Therefore:
   - Same size shapes will have same moments.
   - Different size shapes will have different moments.

Question 7:

Calculations when (x_0,y_0) = upper left:

a) For 3:
   - $M_{00}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^0y^0=14$
   - $M_{01}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^0y^1=3\cdot(-3)+2\cdot(-2)-1+0+1+2+5\cdot3=4$
   - $M_{10}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^1y^0=2\cdot(-2)+2\cdot(-1)+3\cdot0+4\cdot1+3\cdot2=4$
   - $M_{11}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^1y^1=-2\cdot(-2)+(-2)\cdot3+3+3+3+2-3+6-2-4=6$
   - $M_{20}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^2y^0=2\cdot4+2+4+3\cdot4=26$
   - $M_{02}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^0y^2=8\cdot3^2+3\cdot4+2=86$

b) For 4:
   - $M_{00}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^0y^0=14$
   - $M_{01}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^0y^1=-3+-2+5\cdot(-1)+2\cdot2+2\cdot2+3=4$
   - $M_{10}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^1y^0=-4-2+7+2=3$
   - $M_{11}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^1y^1=2+0+0-2=0$
   - $M_{20}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^2y^0=3\cdot4+9=21$
   - $M_{02}=\sum_{x=-2}^{2}\sum_{y=-3}^{3} g(x,y)x^0y^2=2\cdot9+3\cdot4+7=37$

Question 8:

a) Quantifying the cornerity for each window in the image. We do that by calculating the second Derivation for the window (M) and than Quantifying the matrix (R).

b) Finding the windows with the cornerity value higher than a threshold. The threshold is being set comaperd to the mean of the cornerity value of all the windows