

DS210 HW7 Observations for Question 2

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Based on the results of the program, I noticed that at first, when the number of sides is lower, the area of the polygon and the circle are close, and the difference is more noticeable when the side length is bigger. The area of the polygon is also consistently higher than the area of the circle. This is because the radius of the circle is the apothem of the polygon, so when the two shapes are layered on top of each other, they actually overlap perfectly, except the polygon has corners that stick out which is where the extra area comes from. However, as the number of sides increases, the difference between the two areas decreases and the areas become more similar. The area of the polygon is consistently still greater than the area of the circle though, which still makes sense. The circle and the polygon will overlap each other very nicely but the amount of corners that stick out of the circle would become less and less impactful as the number of sides increases.

Results:

For a Polygon with 6 sides and side lengths of 1.0

Apothem is: 0.87

Area is: 2.60

Circle Area: 2.36

For a Polygon with 6 sides and side lengths of 5.0

Apothem is: 4.33

Area is: 64.95

Circle Area: 58.90

For a Polygon with 6 sides and side lengths of 10.0

Apothem is: 8.66

Area is: 259.81

Circle Area: 235.62

For a Polygon with 12 sides and side lengths of 1.0

Apothem is: 1.87

Area is: 11.20

Circle Area: 10.94

For a Polygon with 12 sides and side lengths of 5.0

Apothem is: 9.33

Area is: 279.90

Circle Area: 273.48

For a Polygon with 12 sides and side lengths of 10.0

Apothem is: 18.66

Area is: 1119.62

Circle Area: 1093.92

For a Polygon with 24 sides and side lengths of 1.0

Apothem is: 3.80

Area is: 45.57

Circle Area: 45.31

For a Polygon with 24 sides and side lengths of 5.0

Apothem is: 18.99

Area is: 1139.36

Circle Area: 1132.85

For a Polygon with 24 sides and side lengths of 10.0

Apothem is: 37.98

Area is: 4557.45

Circle Area: 4531.39

For a Polygon with 128 sides and side lengths of 1.0

Apothem is: 20.37

Area is: 1303.54

Circle Area: 1303.27

For a Polygon with 128 sides and side lengths of 5.0

Apothem is: 101.84

Area is: 32588.39

Circle Area: 32581.84

For a Polygon with 128 sides and side lengths of 10.0

Apothem is: 203.68

Area is: 130353.55

Circle Area: 130327.37

For a Polygon with 256 sides and side lengths of 1.0

Apothem is: 40.74

Area is: 5214.93

Circle Area: 5214.67

For a Polygon with 256 sides and side lengths of 5.0

Apothem is: 203.71

Area is: 130373.18

Circle Area: 130366.64

For a Polygon with 256 sides and side lengths of 10.0

Apothem is: 407.42

Area is: 521492.74

Circle Area: 521466.56

For a Polygon with 512 sides and side lengths of 1.0

Apothem is: 81.49

Area is: 20860.49

Circle Area: 20860.23

For a Polygon with 512 sides and side lengths of 5.0

Apothem is: 407.43

Area is: 521512.37

Circle Area: 521505.83

For a Polygon with 512 sides and side lengths of 10.0

Apothem is: 814.86

Area is: 2086049.49

Circle Area: 2086023.31

For a Polygon with 1024 sides and side lengths of 1.0

Apothem is: 162.97

Area is: 83442.77

Circle Area: 83442.50

For a Polygon with 1024 sides and side lengths of 5.0

Apothem is: 814.87

Area is: 2086069.13

Circle Area: 2086062.58

For a Polygon with 1024 sides and side lengths of 10.0

Apothem is: 1629.74

Area is: 8344276.50

Circle Area: 8344250.32

For a Polygon with 2048 sides and side lengths of 1.0

Apothem is: 325.95

Area is: 333771.85

Circle Area: 333771.58

For a Polygon with 2048 sides and side lengths of 5.0

Apothem is: 1629.75

Area is: 8344296.14

Circle Area: 8344289.59

For a Polygon with 2048 sides and side lengths of 10.0

Apothem is: 3259.49

Area is: 33377184.54

Circle Area: 33377158.36

For a Polygon with 65536 sides and side lengths of 1.0

Apothem is: 10430.38

Area is: 341782637.53

Circle Area: 341782637.26

For a Polygon with 65536 sides and side lengths of 5.0

Apothem is: 52151.89

Area is: 8544565938.16

Circle Area: 8544565931.62

For a Polygon with 65536 sides and side lengths of 10.0

Apothem is: 104303.78

Area is: 34178263752.64

Circle Area: 34178263726.46