

## ENED 1120 – Spring 2024

### HW 13.1: VBA 4 (Arrays and Functions)

#### Task 1 (of 2): Heron's Formula to find the Area of a Triangle

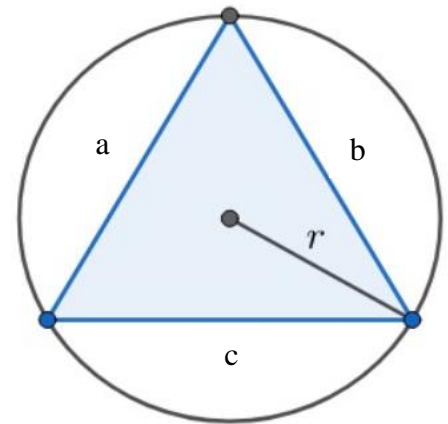
Heron, also known as the Hero of Alexandria, was a Greco-Roman mathematician and engineer who lived in Alexandria, Egypt, during the 1st century AD. He was a great inventor and is best known for his work in mathematics and engineering. Heron's formula is a well-known formula used to find the area of a triangle when you know the lengths of all its three sides.

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

Where  $s$  is the semi-perimeter of the triangle represented as:

$$s = \frac{a+b+c}{2}$$

Your task is to develop a Macro called “Heron” using the starter file “HW\_13p1\_Task1.xlsm” on the community site. The Macro takes the radius of the circumcircle as its input and outputs the area of the triangle (see the image to the right). The file should have the following three functions to determine the Area of an equilateral triangle when the radius of its circumcircle is known.



1. A function called “Side” that takes the radius of the circumcircle as an argument from the Macro and finds the length of the sides of the equilateral triangle where:

$$\text{Side length} = 2 \times r \times \sin\left(\frac{\pi}{3}\right)$$

2. A function called “Semi” to find the semi-perimeter of the equilateral triangle.
3. A function called “Area” to find the area of the equilateral triangle.

#### TEST CASES:

**Input:** Radius = 6

**Output:** Length of each side of the triangle = 10.39, Area of the triangle = 46.77

**Input:** Radius = 7

**Output:** Length of each side of the triangle = 12.12, Area of the triangle = 63.65

**Submit the file to your section site with the following name:**

**HW13p1\_Task1\_UCusername.xlsm** where *UCusername* is your 6+2.

#### Task 2 (of 2): Decision Metrix: Evaluating Inventory with Weighted Criteria

You own an Amazon Store selling a variety of products. You want to evaluate the inventory of the store based on various criteria such as popularity, profit margin, and affordability. Your task is to use the data provided in the file “HW13p1\_Task2.xlsm” on the community site to develop a Macro called “**Decision\_Matrix**” that determines whether each product should be kept in the inventory or retired based on its overall score calculated using weighted criteria and a cutoff score. **The idea is to retire around half of the products to focus on the sales of the other half.** Use **the statistical “Median” as your cutoff criteria.** Please follow the following instructions.

- Start by cleaning Columns “Score” and “Decision” from any previous data. Do NOT delete the titles of these columns. Also, clean the previous Median/Cutoff value.
- Remove any previous color codes from the “Decision” column as well. You did this in HW 12.1 VBA 3.
- Populate arrays with the values from columns B, C, and D. Remember the number of products is not constant as this macro will be used in the future to add more products and make future decisions.
- Create a function that takes the three criteria as arguments and returns to your Macro a score for each product based on the following weighted criteria:

$$\text{Score} = 40\% \text{ Popularity} + 30\% \text{ Profit Margin} + 30\% \text{ Affordability}$$

- The Macro will use the score of each product and the cutoff criteria to make a decision to either “Keep” or “Retire” the product. Color code the cells with “Keep” as Green while cells with “Retire” as Red.
- The cutoff criteria is the Median of all the scores. “Keep” products with scores at or greater than the cutoff. “Retire” others. Hint: To find the cutoff, you could put all the scores in an array and use this function:

**Application.WorksheetFunction.Median(The Array)**

**TEST CASE:** You should get the following first 8 lines when you run the program with the given data.

	A	B	C	D	E	F	G	H	I	J	K
1	Product Name	Popularity	Profit Margin	Affordability			Score	Decision			
2	iPhone 15	0.93	0.25	0.38			0.56	Keep			
3	Samsung Galaxy	0.85	0.3	0.39			0.55	Keep			
4	Dell XPS 13	0.7	0.22	0.25			0.42	Retire		Median/Cutoff =	0.54
5	Nike Air Max	0.87	0.3	0.40			0.56	Keep			
6	Sony PlayStation	0.85	0.18	0.38			0.51	Retire			
7	Canon EOS R6	0.64	0.28	0.38			0.45	Retire			
8	Gucci Handbag	0.75	0.35	0.63			0.59	Keep			
9	Bose Noise	0.66	0.27	0.38			0.46	Retire			

**Submit the file to your section site with the following name:**

**HW13p1\_Task2\_UCusername.xlsm** where *UCusername* is your 6+2.