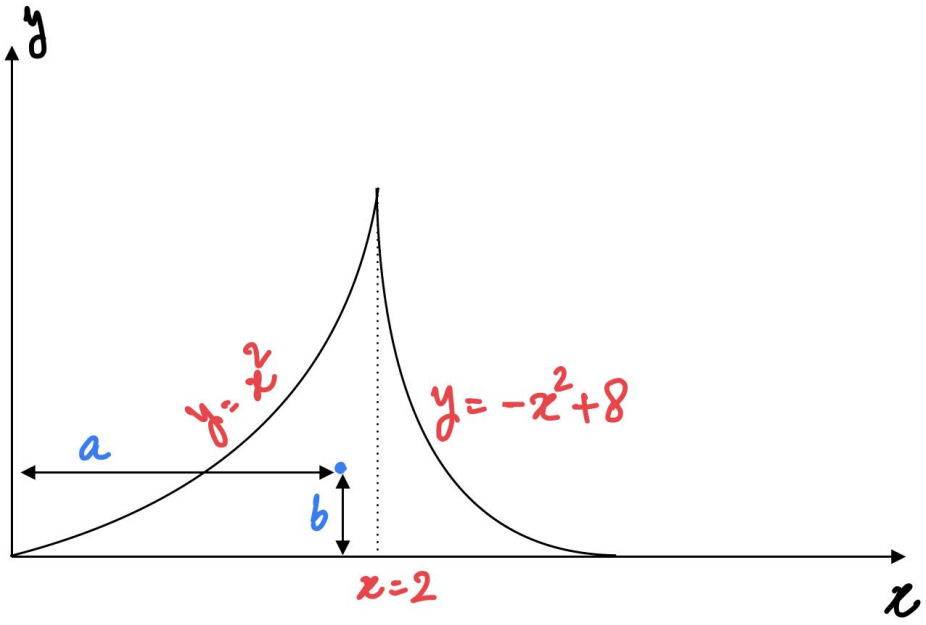
For this exercise, I don't want you to calculate the integrals analytically or by using symbolic libraries such as sympy.



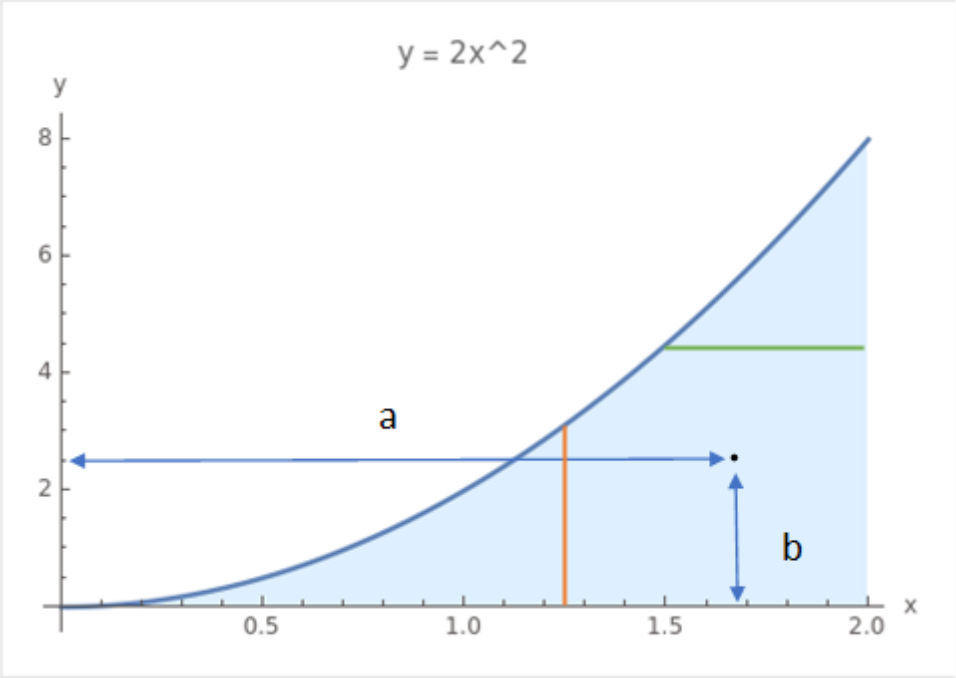
Write a code which will calculate the centroid location (a,b) of the figure (blue region) shown above. Hints:

1. You should first find out what are the coordinate of the vertex where the two curves meet. You should also find out the x coordinate of the point where the second curve intersects the x-axis. You will need these information.
2. For calculating 'a', it's easiest to divide the region into two sub-regions, calculate the x-coordinate of the centroids in each sub-region and then use the formula for the centroid of composite areas.
3. For calculating 'b', you can again follow the above although it is also possible (and easier) to directly calculate 'b' without dividing the region into two sub-regions.

General equations:

$$a = \frac{\int x dA}{A} \qquad b = \frac{\int y dA}{A}$$

Note that you will need to figure out the appropriate dA (like we did in the last coding exercise and also discussed in class). For your reference here is the problem from the last coding exercise with the dA regions shown:



Numerical integration in python:

quad is a powerful function from the `scipy.integrate` module which provides adaptive quadrature methods for numerical integration. The function is easy to use and provides highly accurate results. Here's a step-by-step guide on how to use `quad`:

```
# Step 1: Import necessary libraries.
from scipy.integrate import quad

# Step 2: Define the function to be integrated.
def f(x):
    return x**2  # Example: f(x) = x^2, but you can replace this with any function

# Step 3: Define the interval of integration [x1, x2].
x1 = 0
x2 = 2

# Step 4: Use the quad function to compute the integral.
# The quad function returns two values: the estimated value of the integral and an estimate of the absolute error
integral_value, error_estimate = quad(f, x1, x2)

# Step 5: Print the results.
print(f"The numerical integral of f(x) from {x1} to {x2} is approximately {integral_value:.6f}")
print(f"Estimated absolute error in the result is {error_estimate:.6e}")
```

```
The numerical integral of f(x) from 0 to 2 is approximately 2.666667
Estimated absolute error in the result is 2.960595e-14
```

Submission requirements:

- A single pdf document should be submitted. It should include your python code and clearly print out the values ‘a’ and ‘b’.