

8. [10 points] The citizens of Srebmun Foyoj have decided to put a bed of mumertxe flowers in their new park. The floral density D (in flowers per square meter) of a flowerbed of area A square meters is given by $D = f(A)$. Formulas for $f(A)$ and its derivative $f'(A)$ are given below.

$$f(A) = 30 \left(\frac{A^3 - 4.5A^2 + 4.5A - 0.5}{e^A} \right) + 15, \quad \text{and} \quad f'(A) = -30 \left(\frac{(A - 0.5)(A - 2)(A - 5)}{e^A} \right).$$

- a. [5 points] The citizens intend to make the area of the flowerbed between 1.5 and 3.5 square meters. What area A (with $1.5 \leq A \leq 3.5$) should they make the flowerbed in order to maximize the density of the flowers in the flowerbed? Use calculus to find and justify your answer, and be sure to show enough evidence to demonstrate that the area you find does indeed maximize the density of the flowers.

Answer: Maximum density when area $A =$ _____

- b. [5 points] Suppose instead that the citizens can make the flowerbed any area greater than or equal to 1.5 square meters. What are the largest and smallest densities this flowerbed could have? Use calculus to find your answer and be sure to show enough evidence to demonstrate that you have found the minimum and maximum densities.

(For each answer blank below, write NONE if appropriate.)

Answer: Maximum density: $D =$ _____

Answer: Minimum density: $D =$ _____