

Matriculation number: 10009012

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1. How big is the parabolic segment between the parabola  $f(x) = 2x^2$  and the line  $g(x) = 4 + 2x$ ?

Sketch a graph to visualize the desired area.

2. Given the function

$$f(x) = 5x^2 - 6x^3$$

(a) Sketch  $f$ ,  $f'$  and  $f''$  in one coordinate system.

(b) Identify all of the minimum and maximum points and find its inflection points.

3. Find all eigenvalues and eigenvectors of the matrix

$$A = \begin{bmatrix} 6 & -3 \\ -36 & 9 \end{bmatrix}.$$