

Matriculation number: 10003456

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1. (k points) 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. (k points) Given the function

$$f(x) = 4x^2 - 6x^3$$

(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

$$A = \begin{bmatrix} -12 & 15 \\ 15 & -12 \end{bmatrix}.$$