

Matriculation number: 10005678

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

Sketch a graph to visualize the desired area.

2. (k points) Given the function

$$f(x) = 10x^2 - 7x^3$$

- (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

$$A = \begin{bmatrix} 20 & 12 \\ 12 & -12 \end{bmatrix}.$$