

Matriculation number: 10001234

Student name: Jane Doe

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

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

(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

$$A = \begin{bmatrix} 4 & -2 \\ -24 & 6 \end{bmatrix}.$$