## FULL NAME

## ID NUMBER

$\qquad$

## SIGNATURE

## Resit Exam <br> January 28, 2014

## Questions

1. [20 points] Consider the following optimization problem:

$$
\max _{x \geq 0} \pi(x) \equiv q x^{2 / 3}-2 x
$$

Here, $q>0$ is a fixed parameter. Explain in detail why $x^{\star}=0$ is not a solution to this problem.
2. [10 points] Consider the following optimization problem:

$$
\min _{y \in \mathbb{R}} f(y) \equiv \alpha-2 y^{3}
$$

Here, $\alpha>0$ is a fixed parameter. Explain in detail why this problem does not have a solution.
3. [20 points] Consider the following system of linear equations:

$$
A x=0
$$

Here, 0 is the null vector and $A$ is a square matrix of order $n \times n$ such that

$$
a_{i j}=0 \quad \text { if } i \neq j
$$

and

$$
a_{i j}=i \quad \text { if } i=j
$$

where $i, j \in\{1,2, \ldots, n\}$ index rows and columns. Explain in detail why this system does not have a nontrivial solution $x^{\star} \neq 0$.

