Name and surname: **Date: November 07, 2019**

EXAM 5 (duration: 40 minutes)

DatZ1143: Discrete mathematics for computing
Instructor: Abuzer Yakaryılmaz
Autumn 2019

Questions

(There are 3 questions with total 10 points.)

1) Use mathematical induction to prove that the following summation

$$1 + 2 + 2^2 + 2^3 + \cdots + 2^n$$

is equal to $2^{n+1} - 1$. (4 points)

2) Use mathematical induction to prove that $n^2 - 6n - 1 > 0$ for every integer $n \geq 7$. (3 points)

3) Let $P(n)$ be the following statement

$$P(n) : 1 + 3 + 5 + 7 + \cdots + (2n - 1) = n^2 + 1,$$

where n is a positive integer.

3.a) Show that $\forall n(P(n) \rightarrow P(n + 1))$ is True. (2 points)

3.b) Show that $\forall n P(n)$ is False. (1 point)