OKAN ÜNİVERSİTESİ
MÜHENDİSLİK-MİMARLIK FAKÜLTESİ
MÜHENDİSLİK TEMEL BİLİMLERİ BÖLÜMÜ

2015–16 **MAT234 Matematik IV – Ödev 1** N. Course

SON TESLİM TARİHİ: Salı 16 Şubat 2016 saat 16:00'e kadar.

Egzersiz 1 (Symbolic Logic).

(a) [20p] Use a truth table to prove that

$$(P \wedge (Q \vee R)) = ((P \wedge Q) \vee (P \wedge R)).$$

e.g.

P	Q	R	$Q \vee R$	$(P \wedge (Q \vee R))$	$P \wedge Q$	$P \wedge R$	$(P \wedge Q) \vee (P \wedge R)$
T	T	T					
T	T	F					
T	F	T					
T	F	F					
F	T	T					
F	T	F					
F	F	T					
F	F	F					

(b) [20p] Negate the following proposition:

$$(\forall \varepsilon > 0)(\exists N \in \mathbb{N})(\forall n \in \mathbb{N})(n > N \Rightarrow |a_n| < \varepsilon).$$

Egzersiz 2 (Proof by Induction). [30p] Use *proof by induction* to prove that

$$1 + 2 + 3 + 4 + 5 + \ldots + n = \frac{n(n+1)}{2}$$

for all $n \in \mathbb{N}$.

[Note: It is possible to prove this result as follows:

$$\begin{array}{rcccccccccccccc}
2(1+2+3+4+5+\ldots+n) = & & 1 & + & 2 & + & 3 & + & 4 & + & 5 & + & \ldots & + & n \\
 & + & n & + & (n-1) & + & (n-2) & + & (n-3) & + & (n-4) & + & \ldots & + & 1 \\
 & = & (n+1) & + & (n+1) & + & (n+1) & + & (n+1) & + & (n+1) & + & \ldots & + & (n+1) \\
 & = & n(n+1). & & & & & & & & & & & &
\end{array}$$

However, I want you to prove it using *proof by induction*.]

Egzersiz 3 (Proof by Contrapositive). [30p] Let $x, y \in \mathbb{R}$. Use *proof by contrapositive* to prove that

$$xy \notin \mathbb{Q} \implies ((x \notin \mathbb{Q}) \vee (y \notin \mathbb{Q})).$$