The 7th Quiz of Calculus 0514

學號：_____ 姓名: _____

1. (30%) Determine whether the sequence converges or diverges. If it converges, find the limit.

   (1). $a_n = \left(1+\frac{1}{n}\right)^n$ (2). $a_n = \frac{n^2}{2^n - 1}$ (3). $a_n = \frac{1\cdot 3\cdot 5\cdot \cdots \cdot (2n-1)}{n!}$

2. (50%) Determine whether the series is convergent or divergent.

   (1). $\sum_{n=0}^{\infty} \frac{3}{2^n}$ (2). $\sum_{n=1}^{\infty} \frac{1}{n}$ (3). $\sum_{n=1}^{\infty} \frac{1}{n^2}$ (4). $\sum_{n=2}^{\infty} \frac{n}{\ln n}$ (5). $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$

3. (20%)Consider the sequence $\sqrt{6}, \sqrt{6+\sqrt{6}}, \sqrt{6+\sqrt{6+\sqrt{6}}}, \cdots$

(a) Show that the sequence converges.

(b) Find $\lim_{n\to\infty} a_n$