Sequences Worksheet

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Exercises

I. Find function representation of the following sequences. For each sequence, determine whether it converges or diverges. If it converges, find its limiting value and prove it using $\epsilon - N$ definition.

a. $\frac{1}{2},\ -\frac{2}{3},\ \frac{3}{4},\ -\frac{4}{5},\ \ldots$

b. $1,\ 3,\ 5,\ 7,\ \ldots$

c. $\frac{1}{3},\ \frac{2}{5},\ \frac{3}{7},\ \frac{4}{9},\ \ldots$

II. Determine if the following sequences converge or diverge. If the sequence converges find its limiting value. You may use the monotone sequence theorem or L'Hopitals rule.

a. $\left\{1 - \frac{1}{n}\right\}_{n=1}^{\infty}$

b. $\left\{n - n^2\right\}_{n=1}^{\infty}$

c. $a_1 = 2,\ a_{n+1} = \frac{1}{2}\left(a_n + \frac{2}{a_n}\right)$