1. Find the limit of the sequence

$$0.2, 0.23, 0.233, 0.2333, ...$$

2. Find the limit of the sequence

$$\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, ...$$

3. Find the limit:

$$\lim_{n\to\infty} \left(\frac{1}{n^2} + \frac{2}{n^2} + \frac{3}{n^2} + ... \frac{n-1}{n^2} \right).$$

4. Find the limit:

$$\lim_{n\to\infty} \left(\frac{1^2 + 2^2 + 3^2 + .. + n^2}{n^3} \right).$$

5. Find the limit:

$$\lim_{n\to\infty} \frac{1}{n} \sqrt[n]{n(n+1)(n+2)...(n+n)}.$$

6. Find the limit:

$$\lim_{n\to\infty} \sum_{k=0}^{2n} \frac{k}{k+n^2}.$$

7. Find the number

$$x = \sqrt{1 + 2\sqrt{1 + 3\sqrt{1 + 4\sqrt{1 + 5\sqrt{1 + ...}}}}}$$

8. Let $x_0 = a$, $x_1 = b$ and $x_{n+2} = \frac{1}{3}(x_n + 2x_{n+1})$ for $n = 0, 1, 2, ...$ Show that the limit $\lim_{n\to\infty} x_n$ exists and find it.