Mathematical analysis. Lesson 3. Homework

Plyuhin Aleksandr

1 Execrise 1

1. $\{a_n\}_{n=1}^{\infty} = 2^n - n$

   Sequence is strictly monotonically increasing, because every new term: positive part 2^n is multiplying by 2, and negative part -1 is multiplying by 1.

   Sequence is bounded below by 0.

   $a_5 = 2^5 - 5 = 32 - 5 = 27$

2. $\{b_n\}_{n=2}^{\infty} = \frac{1}{1-n}$

   Sequence is strictly monotonically decreasing,

   Sequence is bounded in $[-1; 0]$.

   $b_6 = \frac{1}{1-6} = -\frac{1}{5}$

3. $\{c_n\}_{n=1}^{\infty} = -1^n + \sqrt{2n}$

   Sequence is strictly monotonically increasing, because negative part -1^n is constantly -1 (there is no braces) and positive part $\sqrt{2n}$ is increasing.

   Sequence is bounded below by $-1 + \sqrt{2}$.

   $c_5 = -1 + \sqrt{2}$

4. $\{d_n\}_{n=1}^{\infty} = (-1)^{2n} + \frac{1}{n^2}$

   Sequence is strictly monotonically decreasing.

   Sequence is bounded in $[1; 2]$.

   $d_5 = 1 + \frac{1}{5^2} = 1 + \frac{1}{25}$

2 Execrise 2

$a_1 = 128$; $a_{n+1} - a_n = 6$
$a_{n+1} = 128 + 6$
$a_n = 128 + 6 * (n - 1)$
$a_{12} = 128 + 6 * 11 = 194$