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Namangan Davlat universiteti

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Oliy ta`limning 5130100-Matematika yo`nalishi I-bosqich
talabalari kunduzgi bo`limi uchun

«Matematik tahlil»
fanidan

«**Sonli ketma-ketlik va uning limiti**»
mavzusi bo`yicha

amaliy dars ishlanmasi

Mazkur amaliy dars ishlanmasida sonli ketma-ketlik, chegaralangan sonli ketma-ketlik, nuqtaning atrofi, sonli ketma-ketlikning limiti tushunchalari bayon qilingan. Dars amaliy mashg`ulot bo`lgani sababli, ishchi dasturda ko`rsatilgan adabiyotlar bo`yicha ko`pgina misolllar oddiydan murakkablashtirilib ishlab ko`rsatilgan va mavzuga oid test savollari, mustaqil ish topshiriqlari va adabiyotlar ro`yxati keltirilgan

Namangan-2011

MAVZU. Sonli ketma-ketlik va uning limiti.

REJA:

1. Sonlar ketma-ketligi tushunchasi.
2. Sonlar ketma-ketligining limiti.
3. Mavzuga doir misollar.
4. Mavzuga doir testlar.
5. Mustaqil ish topshiriqlari.

1. Sonlar ketma-ketligi tushunchasi.

Har bir natural n songa biror haqiqiy x_n sonini mos qo`yuvchi

$$f : n \to x_n, \quad (n = 1, 2, 3, ...) \qquad (1)$$

akslantirishni qaraymiz.

1-ta`rif. 1- akslantirishning akslaridan iborat ushbu

$$x_1, \ x_2, \ x_3, \ ..., \ x_n, \ ... \qquad (2)$$

to`plam **sonlar ketma-ketligi** deyiladi. Uni $\{x_n\}$ yoki x_n kabi belgilanadi.

$x_n \ (n = 1, 2, 3, ...)$ sonlar (2) **ketma-ketlikning hadlari** deyiladi. Masalan,

1) $x_n = \frac{1}{n}: \ 1, \ \frac{1}{2}, \ \frac{1}{3}, \ ..., \ \frac{1}{n}, \ .... ,$

2) $x_n = (-1)^n : -1, 1, -1, ..., (-1)^n, ...$

3) $x_n = \sqrt[n]{n} : 1, \ \sqrt{2}, \ \sqrt[3]{3}, ..., \ \sqrt[n]{n}, ...$

4) $x_n = 1 : 1, 1, 1, ..., 1, ...$

5) $0,3; \ 0,33; \ 0,333; ...; \ 0,\underbrace{333...3}_{n \text{ ta}}; ...$

lar sonlar ketma-ketliklaridir.

Biror $\{x_n\}$ ketma-ketlik berilgan bo`lsin.

2-ta`rif.** Agar shunday o`zgarmas M soni mavjud bo`lsaki, ixtiyoriy $x_n \ (n = 1, 2, 3, ...)$ uchun $x_n \le M$ tengsizlik bajarilsa (ya`ni $\exists M, \ \forall n \in N : x_n \le M$ bo`lsa), $\{x_n\}$ ketma-ketlik **yuqoridan chegaralangan deyiladi.

3-ta`rif.** Agar shunday o`zgarmas m soni mavjud bo`lsaki, ixtiyoriy $x_n \ (n = 1, 2, 3, ...)$ uchun $x_n \ge m$ tengsizlik bajarilsa (ya`ni, $\exists m, \ \forall n \in N : x_n \ge m$ bo`lsa), $\{x_n\}$ ketma-ketlik **quyidan chegaralangan deyiladi.

4-ta`rif.** Agar $\{x_n\}$ ketma-ketlik ham yuqoridan, ham quyidan chegaralangan bo`lsa (ya`ni $\exists m, M, \ \forall n \in N : m \le x_n \le M$ bo`lsa), $\{x_n\}$ ketma-ketlik **chegaralangan deyiladi. **Misol.** Ushbu

$$x_n = \frac{n}{4 + n^2} \qquad (n = 1, \ 2, \ 3, ...)$$

ketma-ketlikning chegaralanganligi isbotlansin.

◄ Ravshanki, $\forall n \in N$ uchun

$$x_n = \frac{n}{4 + n^2} > 0$$

bo`ladi. Demak, qaralayotgan ketma-ketlik quyidan chegaralangan.

Ma`lumki,

$$0 \le (n-2)^2 = n^2 - 4n + 4$$

bo`lib, undan $4n \le 4 + n^2$ ya`ni,

$$\frac{n}{4+n^2} \le \frac{1}{4}$$

bo`lishi kelib chiqadi. Bu esa berilgan ketma-ketlikning yuqoridan chegaralanganligini bildiradi.

Demak, ketma-ketlik chegaralangan ►

5-ta`rif. Agar $\{x_n\}$ ketma-ketlik uchun

$$\forall M \in R, \quad \exists \; n_0 \in N: \quad x_{n_0} > M$$

bo`lsa, **ketma-ketlik yuqoridan chegaralanmagan** deyiladi.

2. Sonlar ketma-ketligining limiti.

Aytaylik, $a \in R$ son hamda ixtiyoriy musbat ε son berilgan bo`lsin.

6-ta`rif. Ushbu

$$U_\varepsilon(a) = \{x \in R \mid \; a - \varepsilon < x < a + \varepsilon \;\} = (a - \varepsilon, \;\; a + \varepsilon)$$

to`plam a **nuqtaning** ε **- atrofi** deyiladi.

Faraz qilaylik $\{x_n\}$ ketma-ketlik va $a \in R$ soni berilgan bo`lsin.

**7-ta`rif**. Agar ixtiyoriy $\varepsilon > 0$ son olinganda ham shunday $n_0$ natural soni mavjud bo`lsaki, $n > n_0$ tengsizlikni qanoatlantiruvchi barcha natural sonlar uchun

$$|x_n - a| < \varepsilon \qquad (3)$$

tengsizlik bajarilsa, (ya`ni

$$\forall \varepsilon > 0, \quad \exists n_0 \in N, \quad \forall n > n_0: \; |x_n - a| < \varepsilon$$

bo`lsa), a son $\{x_n\}$ **ketma-ketlikning limiti** deyiladi va

$$a = \lim_{n\to\infty} x_n \text{ yoki } n \to \infty \text{ da } x_n \to a$$

kabi belgilanadi.

Ravshanki, yuqoridagi (3) tengsizlik uchun

$$|x_n - a| < \varepsilon \Leftrightarrow a - \varepsilon < x_n < a + \varepsilon$$

ya`ni, $x_n \in U_\varepsilon(a), \quad (n > n_0)$ bo`ladi. SHuni e`tiborga olib, ketma-ketlikning limitini quyidagicha ta`riflasa bo`ladi.

**8-ta`rif.** Agar $a$ nuqtaning ixtiyoriy $U_\varepsilon(a)$ atrofi olinganda ham $\{x_n\}$ ketma-ketlikning biror hadidan keyingi barcha hadlari shu atrofga tegishli bo`lsa, a son $\{x_n\}$ ketma-ketlikning limiti deyiladi.

Yuqorida keltirilgan ta`riflardan ko`rinadiki ε ixtiyoriy musbat son bo`lib, natural $n_0$ soni esa $\varepsilon$ ga va qaralayotgan ketma-ketlikka bog`liq ravishda topiladi.

Misol. Ushbu

$$x_n = c \quad (c \in R, \; n = 1, 2, 3, ...)$$

ketma-ketlikning limiti c ga teng bo`ladi.

◄Haqiqatan ham, bu holda $\forall \;\; \varepsilon > 0$ ga ko`ra $n_0 = 1$ deyilsa, unda $\forall n > n_0$ uchun $|x_n - c| = 0 < \varepsilon$ bo`ladi. Demak, $\lim\limits_{n\to\infty} x_n = \lim\limits_{n\to\infty} c = c$ ►

Teorema. Agar $\{x_n\}$ ketma-ketlik limitga ega bo`lsa, u yagona bo`ladi.

3. Mavzuga doir misollar.

41. Ketma-ketlik limitining ta`rifidan foydalanib $x_n = \dfrac{n}{n+1}$, $n = 1, 2, \ldots$ ketma-ketlik uchun $\lim\limits_{n\to\infty} x_n = 1$ ekanini isbotlang, ya`ni ixtiyoriy $\varepsilon > 0$ uchun $n > N$ bo`lganda $|x_n - 1| < \varepsilon$ tengsizlik bajariladigan $N(\varepsilon)$ sonni toping.

Quyidagi jadvalni to`ldiring:

ε	0,1	0,01	0,001	0,0001
N				

◀ Ketma-ketlik limitining ta`rifiga ko`ra ixtiyoriy $\varepsilon > 0$ uchun

$$\left|\frac{n}{n+1} - 1\right| = \left|\frac{-1}{n+1}\right| = \frac{1}{n+1} < \varepsilon$$

ga egamiz. Bu tengsizlikni n ga nisbatan echib $N(\varepsilon)$ ni topamiz:

$$n > \frac{1}{\varepsilon} - 1 \quad \Rightarrow \quad N(\varepsilon) = \left[\frac{1}{\varepsilon} - 1\right].$$

Jadvalni to`ldiramiz:

ε	0,1	0,01	0,001	0,0001
N	9	99	999	9999

▶

42. x_n $(n = 1, 2, \ldots)$ ketma-ketlik cheksiz kichik$\left(\lim\limits_{n\to\infty} x_n = 0\right)$ ekanini isbotlang, ya`ni ixtiyoriy $\varepsilon > 0$ uchun $n > N$ bo`lganda $|x_n| < \varepsilon$ tengsizlik bajariladigan $N(\varepsilon)$ sonni ko`rsating.

$а)\ x_n = \dfrac{(-1)^{n+1}}{n}$; $\quad б)\ x_n = \dfrac{2n}{n^3+1}$; $\quad в)\ x_n = \dfrac{1}{n!}$; $\quad г)\ x_n = (-1)^n \cdot 0{,}999^n$.

◀ Ketma-ketlik limitining ta`rifidan foydalanamiz. Ixtiyoriy $\varepsilon > 0$ uchun

$$б)\quad \left|\frac{2n}{n^3+1}\right| < \frac{2n}{n^3} = \frac{2}{n^2} < \varepsilon \quad \Leftrightarrow \quad n < \sqrt{\frac{2}{\varepsilon}} \quad \Rightarrow \quad N(\varepsilon) = \left[\sqrt{\frac{2}{\varepsilon}}\right].$$

$г)$ $\left|(-1)^n \cdot 0{,}999^n\right| = 0{,}999^n < \varepsilon \quad \Leftrightarrow \quad n \cdot \lg 0{,}999 < \lg \varepsilon$, bunda $\lg 0{,}999 < 0$ bo`lgani uchun

$$n > \frac{\lg \varepsilon}{\lg 0{,}999} \approx 2330 \cdot \lg \frac{1}{\varepsilon} \quad \Rightarrow \quad N(\varepsilon) = \left[2330 \cdot \lg \frac{1}{\varepsilon}\right]$$ ▶

43. Quyidagi

$а)\, x_n = (-1)^n \cdot n$, $\quad б)\, x_n = 2^{\sqrt{n}}$, $\quad в)\, x_n = \lg(\lg n)$, $n \ge 2$

ketma-ketliklar cheksiz katta $(\lim\limits_{n\to\infty} x_n = \infty)$ ekanligini isbotlang, ya`ni ixtiyoriy etarlicha katta $E > 0$ uchun $n > N$ bo`lganda $|x_n| > E$ tengsizlik bajariladigan $N(E)$ sonni ko`rsating.

◀ $E > 0$ - etarlicha katta son bo`lsin. U holda

$$б)\ |x_n| = 2^{\sqrt{n}} > E \quad \Leftrightarrow \quad n > (\lg E)^2 \cdot (\lg 2)^{-2} \quad \Rightarrow \quad N(E) = \left[(\lg E)^2 \cdot (\lg 2)^{-2}\right].$$ ▶

44. $x_n = n^{(-1)^n}$ $(n = 1, 2, \ldots)$ ketma-ketlik chegaralanmagan va shu bilan birga $n \to \infty$ da cheksiz katta emasligini isbotlang.

◀ $\varepsilon > 0$ ixtiyoriy son bo`lsin. U holda $n = 2k$ va $k > \dfrac{\varepsilon}{2}$ bo`lganda

$\left|x_{2k}\right| = (2k)^{(-1)^{2k}} = 2k > \varepsilon$, ya`ni x_n chegaralanmagan. Vaholanki, $\varepsilon > 1$ va $n = 2k-1$ da

$\left|x_{2k-1}\right| = (2k-1)^{(-1)^{2k-1}} = \dfrac{1}{2k-1} < 1 < \varepsilon$,

ya`ni cheksiz katta emas ►

45. Quyidagi tasdiqlarni tengsizliklar yordamida yozing:

$a)\lim\limits_{n\to\infty} x_n = \infty$; $\quad б)\lim\limits_{n\to\infty} x_n = -\infty$; $\quad в)\lim\limits_{n\to\infty} x_n = +\infty$.

◄ $a)\lim\limits_{n\to\infty} x_n = \infty \Leftrightarrow \forall\varepsilon > 0\ \exists N(\varepsilon)\ \ \forall n > N(\varepsilon):\ \left|x_n\right| > \dfrac{1}{\varepsilon}$.►

Quyidagi limitlarni aniqlang($n \in N$):

46. $\lim\limits_{n\to\infty} \dfrac{10000n}{n^2+1}$.

Echimi. Limit ostidagi kasrning surat va maxrajini n^2 ga bo`lamiz va limitning xossalaridan foydalanib topamiz:

$$\lim_{n\to\infty} \frac{10000n}{n^2+1} = \lim_{n\to\infty} \frac{\frac{10000}{n}}{1+\frac{1}{n^2}} = \frac{0}{1+0} = 0$$

48. $\lim\limits_{n\to\infty} \dfrac{\sqrt[3]{n^2}\sin n!}{n+1}$.

Echimi. Limit ostidagi kasrning surat va maxrajini $n^{\frac{2}{3}}$ ga bo`lamiz. U holda $\sin n!$ chegaralanganligidan va limitning xossalaridan foydalanib topamiz:

$$\lim_{n\to\infty} \frac{\sqrt[3]{n^2}\sin n!}{n+1} = \lim_{n\to\infty} \frac{\sin n!}{n^{\frac{1}{3}} + \frac{1}{\sqrt[3]{n}^{2}}} = 0$$

50. $\lim\limits_{n\to\infty} \dfrac{1+a+a^2+\ldots+a^n}{1+b+b^2+\ldots+b^n}$, $\ \left|a\right| < 1,\ \left|b\right| < 1$.

Echimi. Limit ostidagi kasrning surat va maxrajidagi yig`indilarni topib(geometrik progressiya yig`indisi sifatida) va limitning xossalaridan foydalanib topamiz:

$$\lim_{n\to\infty} \frac{1+a+a^2+\ldots+a^n}{1+b+b^2+\ldots+b^n} = \lim_{n\to\infty} \frac{\frac{1-a^{n+1}}{1-a}}{\frac{1-b^{n+1}}{1-b}} = \frac{1-b}{1-a}\cdot\frac{1-\lim a^{n+1}}{1-\lim b^{n+1}} = \frac{1-b}{1-a}.$$

Bu erda $\left|a\right| < 1$ bo`lganda $\lim\limits_{n\to\infty} a^n = 0$ ekanligidan foydalandik(49-misol echimiga qarang).

52. $\lim\limits_{n\to\infty} \left|\dfrac{1}{n} - \dfrac{2}{n} + \dfrac{3}{n} - \ldots + \dfrac{(-1)^{n-1}n}{n}\right|$.

Echimi. $1)\ n = 2k$ da

$$\lim_{n\to\infty} \left|\frac{1}{n} - \frac{2}{n} + \frac{3}{n} - \ldots + \frac{(-1)^{n-1}n}{n}\right| = \lim_{n\to\infty} \left|\frac{\overbrace{-1+(-1)+\ldots+(-1)}^{k\ ma}}{n}\right| = \lim_{n\to\infty} \left|\frac{-\frac{n}{2}}{n}\right| = \frac{1}{2}$$

$2)\ n = 2k+1$ da

$$\lim_{n\to\infty}\left|\frac{1}{n}-\frac{2}{n}+\frac{3}{n}-\ldots+\frac{(-1)^{n-1}n}{n}\right| = \lim_{n\to\infty}\left|\frac{\overbrace{-1+(-1)+\ldots+(-1)}^{k\ ma}+n}{n}\right| = \lim_{n\to\infty}\left|\frac{-\frac{n-1}{2}+n}{n}\right| = \lim_{n\to\infty}\frac{n+1}{2n}\to\frac{1}{2}.$$

Demak,

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

53. $\lim\limits_{n\to\infty}\left(\frac{1^2}{n^3}+\frac{2^2}{n^3}+\ldots+\frac{(n-1)^2}{n^3}\right).$

Echimi. 2-misol va limitning xossalaridan foydalanamiz:

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

$$= \lim_{n\to\infty}\frac{\frac{(n-1)n(2n-1)}{6}}{n^3} = \lim_{n\to\infty}\frac{\left(1-\frac{1}{n}\right)\cdot 1\cdot\left(2-\frac{1}{n}\right)}{6} = \frac{(1-0)\cdot(2-0)}{6} = \frac{2}{6} = \frac{1}{3}.$$

55. $\lim\limits_{n\to\infty}\left(\frac{1}{2}+\frac{3}{2^2}+\frac{5}{2^3}+\ldots+\frac{2n-1}{2^n}\right).$

Echimi. Limit ostidagi ifodani $S_n = \frac{1}{2}+\frac{3}{2^2}+\frac{5}{2^3}+\ldots+\frac{2n-1}{2^n}$ kabi belgilaymiz. Unda

$$S_n-\frac{1}{2}S_n = \frac{1}{2}+\left(\frac{3}{2^2}-\frac{1}{2^2}\right)+\left(\frac{5}{2^3}-\frac{3}{2^3}\right)+\ldots+\left(\frac{2n-1}{2^n}-\frac{2n-3}{2^n}\right)-\frac{2n-1}{2^{n+1}} =$$

$$= \frac{1}{2}+\left(\frac{1}{2}+\frac{1}{2^2}+\ldots+\frac{1}{2^{n-1}}\right)-\frac{2n-1}{2^{n+1}}$$

Bundan S_n ni topamiz va limitni hisoblaymiz:

$$S_n = 1+1+\frac{1}{2}+\frac{1}{2^2}+\ldots+\frac{1}{2^{n-2}}-\frac{2n-1}{2^n} = 1+\frac{1-\frac{1}{2^{n-1}}}{1-\frac{1}{2}}-\frac{2n-1}{2^n}$$

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

Bu erda $\lim\limits_{n\to\infty}\frac{n}{2^n}=0$ dan foydalandik. Haqiqatan, $\varepsilon>0$ ixtiyoriy son bo`lsin. U holda

$$\left|\frac{n}{2^n}\right| = \frac{n}{(1+1)^n} = \frac{n}{1+n+\frac{n(n-1)}{2}+\ldots+1} < \frac{n}{\frac{n(n-1)}{2}} < \frac{2}{n-1} < \varepsilon \quad \Leftrightarrow \quad n>1+\frac{2}{\varepsilon} \Rightarrow N(\varepsilon) = \left[1+\frac{2}{\varepsilon}\right].$$

Demak, $\lim\limits_{n\to\infty}\frac{n}{2^n}=0$.

57. $\lim\limits_{n\to\infty}\left(\sqrt{2}\cdot\sqrt[4]{2}\cdot\sqrt[8]{2}\cdot\ldots\cdot\sqrt[2^n]{2}\right)$

Echimi. Radikalning xossasi va geometrik progressiyaning yig`indisidan foydalanamiz:

$$\lim_{n\to\infty}\left(\sqrt{2}\cdot\sqrt[4]{2}\cdot\sqrt[8]{2}\cdot\ldots\cdot\sqrt[2^n]{2}\right)=\lim_{n\to\infty}2^{\frac{1}{2}+\frac{1}{4}+\ldots+\frac{1}{2^n}}=\lim_{n\to\infty}2^{1-\frac{1}{2^n}}=\lim_{n\to\infty}\frac{2}{2^{\frac{1}{2^n}}}.$$

Endi $n>2$ da

$$2=\left(2^{\frac{1}{2^n}}\right)^{2^n}=\left[1+\left(2^{\frac{1}{2^n}}-1\right)\right]^{2^n}>\left[1+\left(2^{\frac{1}{2^n}}-1\right)\right]^{n}=1+n\left(2^{\frac{1}{2^n}}-1\right)+\ldots+\left(2^{\frac{1}{2^n}}-1\right)^n>n\cdot\left(2^{\frac{1}{2^n}}-1\right)$$

Bundan $0<2^{\frac{1}{2^n}}-1<\frac{2}{n}$. Limitning xossasiga ko`ra $\lim\limits_{n\to\infty}2^{\frac{1}{2^n}}=1$. Demak, $\lim\limits_{n\to\infty}\frac{2}{2^{\frac{1}{2^n}}}=2$.

4.Mavzuga doir testlar.

1. $\lim\limits_{n\to\infty}\sqrt{n}\left(\sqrt{n+2}-\sqrt{n-3}\right)$ ni hisoblang.

A) $\frac{4}{3}$ B) $\frac{2}{5}$ *C) $\frac{5}{2}$ D) 3

2. $\lim\limits_{n\to\infty}\left(\frac{1}{n^2}+\frac{2}{n^2}+\ldots+\frac{n-1}{n^2}\right)=?$

$A)\frac{1}{2}$ $*B)1$ $C)\frac{3}{2}$ $D)\frac{1}{3}$

3. $\lim\limits_{n\to\infty}(1+2+3+\ldots+n)\frac{1}{n}$ limitni hisoblang.

A) 1 B) 0 C) $\frac{1}{2}$ *D) ∞

4. $\lim\limits_{n\to\infty}\frac{2n^2-1}{3-n^2}$ limitni hisoblang.

A) $-\frac{1}{3}$ B) 0 C) $\frac{2}{3}$ *D) -2

5. $\lim\limits_{n\to\infty}\frac{n^2-n}{1-n}$ limitni hisoblang.

A) $\frac{1}{2}$ B) 0 *C) ∞ D) 1

6. $\lim\limits_{n\to\infty}\frac{(-1)^n}{2n+5}$ limitni hisoblang.

*A) 0 B) $\frac{1}{2}$ C) ∞ D) $\frac{1}{7}$

7. $\lim\limits_{n\to\infty}\sqrt[n]{a}=?$ $(a>0)$

A) 0 B) a *S)1 D) $\nexists$ E) ∞

8. $\lim\limits_{n\to\infty}\sqrt[n]{n}=?$

A) 0 B)2 *S)1 D)3 E) ∞

9. $\lim\limits_{n\to\infty}\frac{n}{2^n}=?$

*A) 0 B) $\frac{1}{2}$ S)-1 D)1 E) ∞

10. Agar $\{x_n\}$ ketma-ketlik uchun quyidagi shart bajarilsa, ya`ni

$\exists a : \forall \varepsilon > 0 \ \exists n_0 \in N \ \forall n > n_0 \quad |x_n - a| < \varepsilon$, u holda …

A) Ketma-ketlik uzoqlashuvchi *B) Ketma-ketlik yaqinlashuvchi
C) Yaqinlashuvchi ham , uzoqlashuvchi ham emas D) To`g`ri javob yo`q

11. Agar $\{x_n\}$ ketma-ketlik uchun quyidagi shart bajarilsa, ya`ni

$\forall a : \exists \varepsilon > 0 \ \forall \ n_0 \in N \ \exists \ n > n_0 \quad |x_n - a| \geq \varepsilon$, u holda …

*A) Ketma-ketlik uzoqlashuvchi B) Ketma-ketlik yaqinlashuvchi
C) Yaqinlashuvchi ham , uzoqlashuvchi ham emas D) To`g`ri javob yo`q

12. Agar $\{x_n\}$ yaqinlashuvchi bo`lsa, uning limiti …

A) 2 ta B) Mavjud emas *C) Yagona D) Cheksiz

5. Mustaqil ish topshiriqlari.

1. 42 а), в); 43 а), в); 45 б), в).[3]
2. 47, 49, 51, 54, 56.[3]
3. 3.1. punkt misollari: 1-30.[4]

Adabiyotlar.

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