

Mavzu-10. Funksiya haqida tushuncha. Funksiyaning berilish usullari. Elementar funksiyalar. Parametrik, oshkormas va transcendent ko'rinishdagi funksiyalar

Reja:

1. Funksiya ta'rifi, berilish usullari
2. Elementar funksiyalar
3. Parametrik va oshkormas ko'rinishdagi funksiyalar
4. Transcendent ko'rinishdagi funksiyalar

X, Y – haqiqiy sonlar to'plamining qism to'plami bo'lsin va $x \in X, y \in Y$.

Ta'rif-1 X to'plamdagi har bir x elementga Y to'plamdagi yagona y element biror bir qoidaga ko'ra mos qo'yilgan bo'lsa, $y=f(x)$ funksiya berilgan deyiladi.

x – erkli o'zgaruvchi, argument

y – x ning funksiyasi

- Argument x ning qabul qila oladigan barcha qiymatlari to'plami $f(x)$ funksiyaning aniqlanish sohasi deyiladi va $D(x)$ kabi belgilanadi;
- y ning qabul qila oladigan barcha qiymatlari to'plami funksiyaning qiymatlar to'plami deyiladi va $E(y)$ kabi belgilanadi;

Misol 1) $y=2x+1$ $D(x) = R, E(y) = R$

2) $y=\frac{3x-2}{x+1}$ $D(x) = (-\infty; -1) \cup (-1; \infty), E(y) = R$

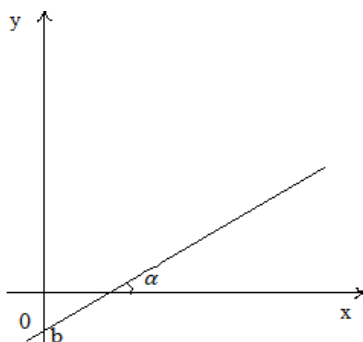
3) $y=\sqrt{x+5}$ $D(x) = [-5; \infty), E(y) = [0; \infty)$

Funksiyaning berilish usullari

1. Analitik usul: $y=5x+2, f(x)=2x^3-3$ va h.k.
2. Jadval usuli:

x	1	2	3	-1	-3
y	3	6	9	-2	-7

3. Grafik usul:

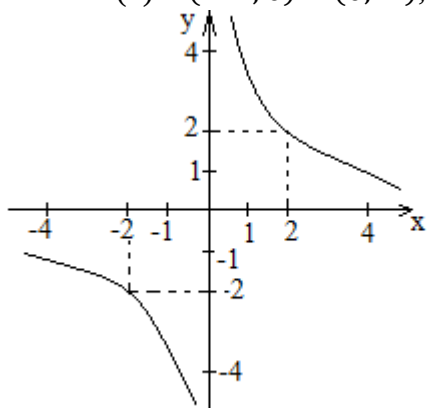


Elementar funksiyalar

- 1) $y = kx+b$ chiziqli funksiya. $D(x) = (-\infty; \infty), E(y) = (-\infty; \infty)$

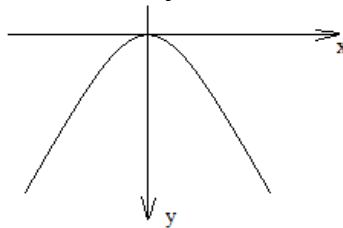
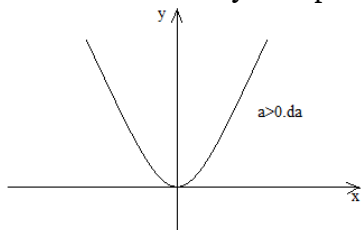
2) $y = \frac{k}{x}$ teskari proporsional funksiya

$$D(x) = (-\infty; 0) \cup (0; \infty), \quad E(y) = (-\infty; 0) \cup (0; \infty)$$

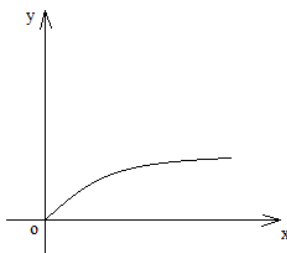


3) $y = ax^n$ ($n \in \mathbb{Z}$) darajali funksiya

Bu funksiya $n=2k-1$, $n=2k$, $n=1-2k$, $n=-2k$ bo'lganda turli xossa va grafiklarga ega bo'ladi. Xususan $n=2$ da $y=ax^2$ parabolani ifodalaydi.



4) $y = \sqrt[n]{x}$ arifmetik ildiz funksiyasi

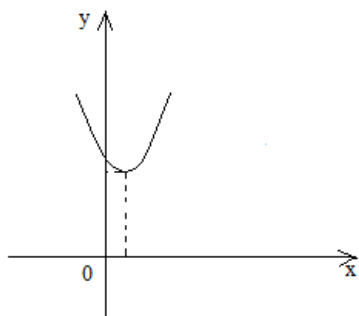


5) $y = ax^2 + bx + c$ - kvadratik funksiya

$$a, b, c \in \mathbb{R}, \quad a \neq 0$$

$$D(x) = (-\infty; \infty) \quad E(y) = (-\infty; \infty)$$

$$\text{Parabolaning uchi} \left(-\frac{b}{2a}; c - \frac{b^2}{4a} \right)$$



Parametrik funksiyalar

Agar $y = f(x)$ funksiyalar berilgan bo'lsin.

Ta'rif-2 $y = f(x)$ funksiyani x ning biror oraliq qiymati orqali berilishi $y = \varphi(t)$ parametrik holda berilishi deyiladi.

Misol $x^2 + y^2 = r^2$ aylana tenglamasi parametrik holda

$$\begin{cases} x = r \cos t \\ y = r \sin t \end{cases} \quad (t \in [0; 2\pi))$$

Oshkormas funksiyalar

Ta'rif-3 $y = f(x)$ funksiya oshkormas holda berilgan deyiladi, agar $F(x,y) = 0$ bo'lsa va

1) $a \leq x \leq b$, $c \leq y \leq d$

2) $\forall x \in [a; b]$ $F(x,y)$ yagona yechimga ega bo'lsa.

Misol $y^2 + \sin y = x^2 + \frac{x^3}{3}$

$$y^2 + \sin y - x^2 - \frac{x^3}{3} = 0 \quad , \quad F(x,y)=0$$

Transendent funksiyalar

Ta'rif-4 $y=f(x)$ funksiya analitik bo'lib, algebraik bo'lmaasa, u transendent funksiya deyiladi.

Masalan, $y = \log_a x$, $y = \sin^2 x + \cos x$, $y = x^{3x+1}$

funksiyalar transendent funksiyalardir.

Takrorlash uchun savollar:

1. Funksiyaga ta'rif bering.
2. Funksiyaning parametrik ko'rinishi.
3. Oshkormas ko'rinishdagi funksiyalar.
4. Transendent funksiyalar.

Foydalanilgan adabiyotlar:

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2. Курс математического анализа. (Л. Кудрявцев) 1998-г. Москва.
3. Oliy matematikadan misol va masalalar. (Sh.Xurramov) 2015-y. Toshkent.
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