

**Funksiya tushunchasi. Asosiy  
elementar funksiyalar  
grafiklari.  
Sonlar ketma-ketligi  
tushunchasi**

# REJA:

1

- Funksiya tushunchasi va berilish usullari

2

- Asosiy elementar funksiyalar va ularning grafiklari

3

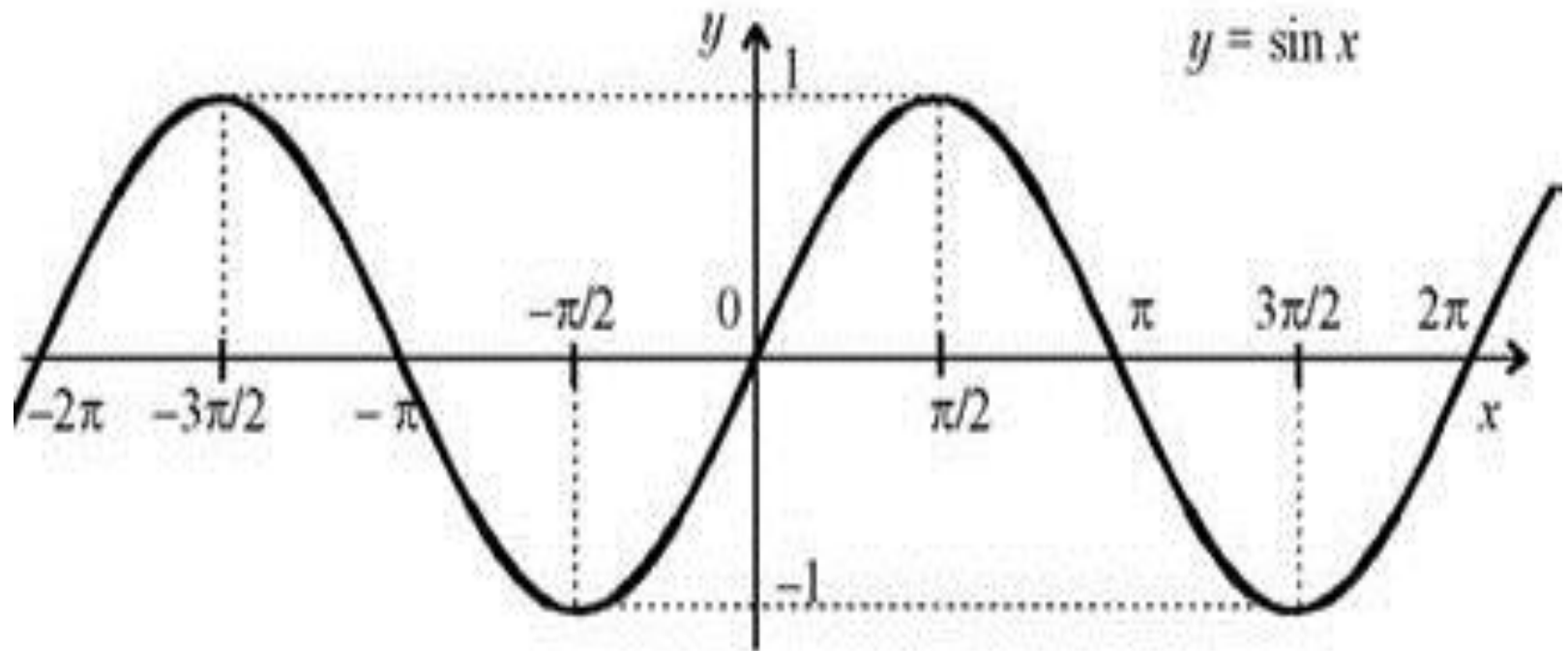
- Sonlar ketma-ketligi tushunchasi

# Funksiya tushunchasi va berilish usullari

Agar bir o'zgaruvchi  $x$  ning har bir qiymatiga boshqa o'zgaruvchi miqdor  $y$  ning to'la aniq qiymati biror usul bilan mos keltirilgan bo'lsa, bu holda bu funksiya berilgan deyiladi. Bunda o'zgaruvchi  $y$  miqdor funksiya,  $x$  miqdor esa argument deb ataladi va quyidagicha belgilanadi:

$$y = f(x)$$

$y = f(x)$  funksiyaning  $x$  argumenti qabul qilishi mumkun bo'lgan barcha qiymatlar to'plami bu funksiyaning aniqlanish sohasi deyiladi.  $y$  funksiyaning o'zi qabul qiladigan qiymatlar to'plami bu funksiyaning o'zgarish sohasi deyiladi. Masalan,  $y = \sin x$  funksiyaning aniqlanish sohasi barcha haqiqiy sonlar to'plamidan iborat, o'zgarish sohasi esa  $[-1;1]$  bo'ladi.



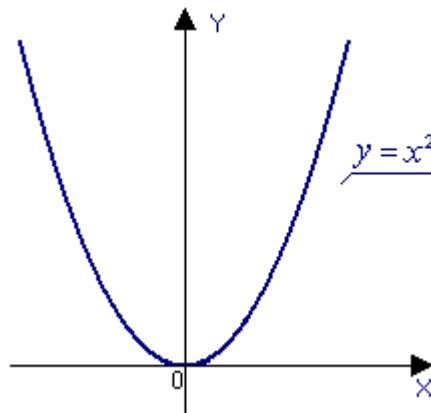
# Funksiyaning berilish usullari:

1. Analitik ko'rinishda:  $y = f(x)$ ;  $y = x^2$

2. Jadval ko'rinishda:

$x$	-1	0	1	3
$y$	1	0	1	9

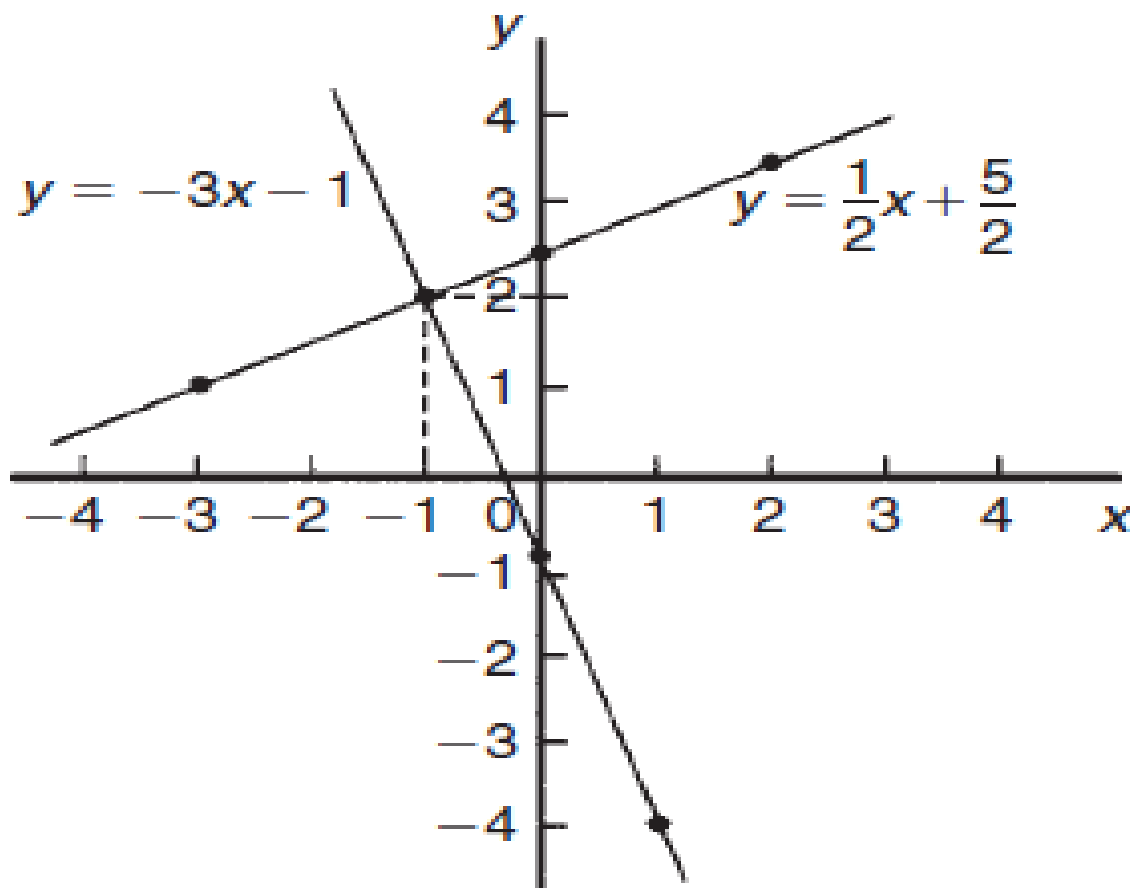
3. Grafik ko'rinishda:



# Chiziqli funksiyalar

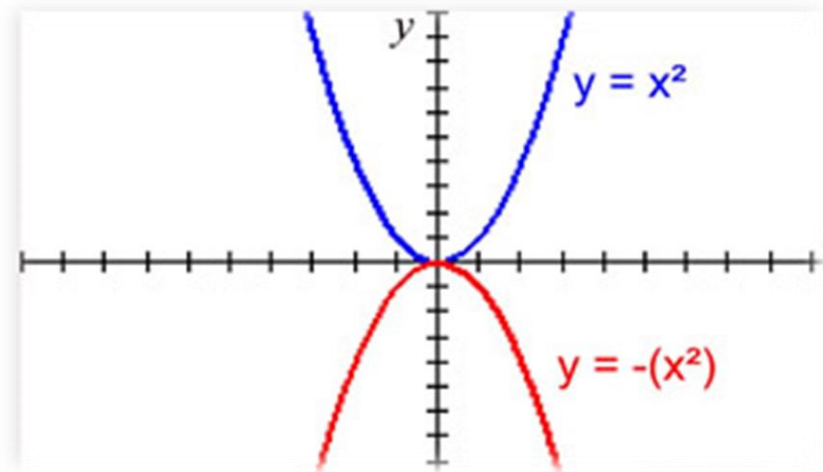
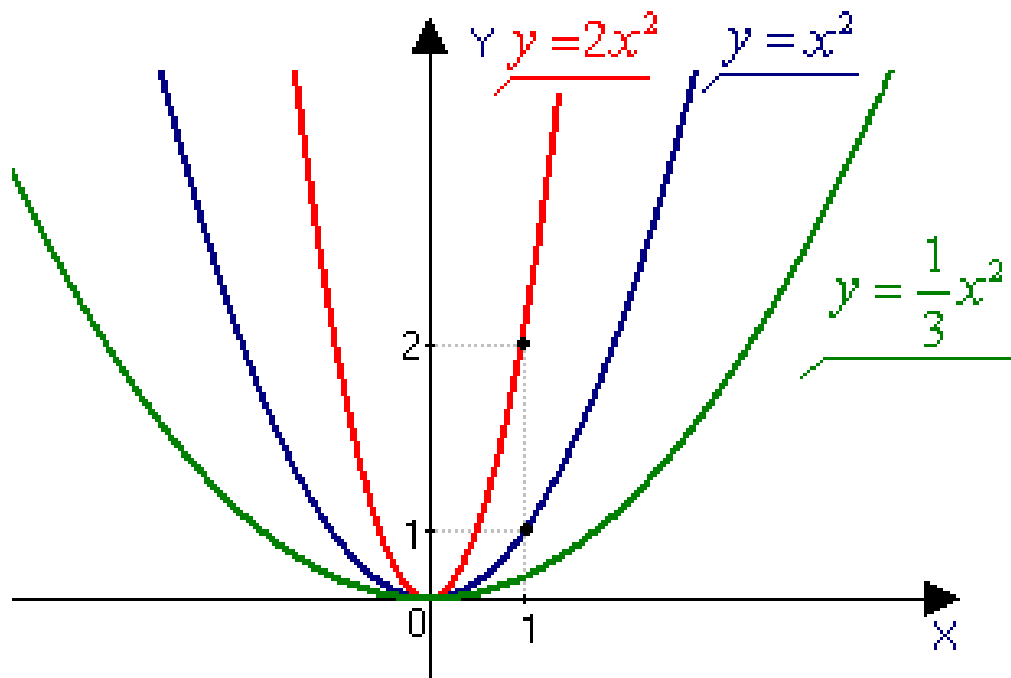


$$y = ax + b$$



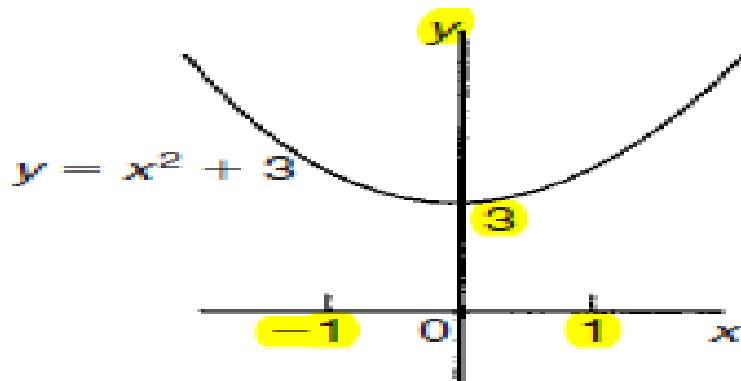
# Kvadrat funksiýalar

$$y = ax^2$$

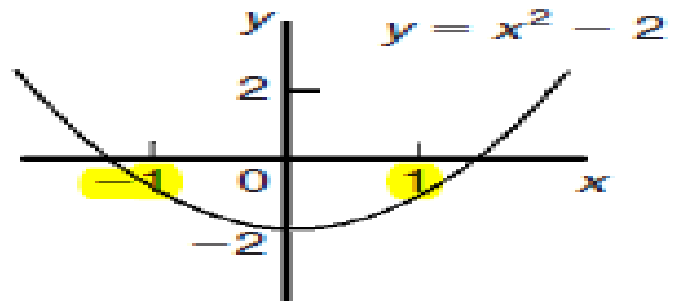




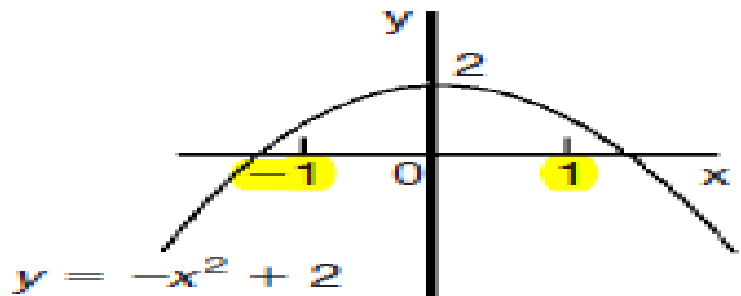
$$y = ax^2 + c$$



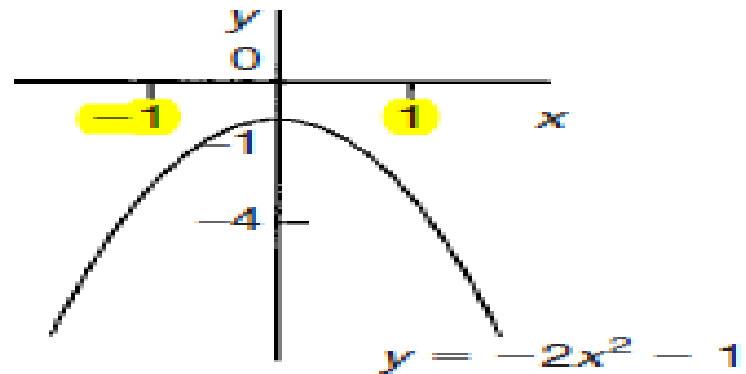
(a)



(b)



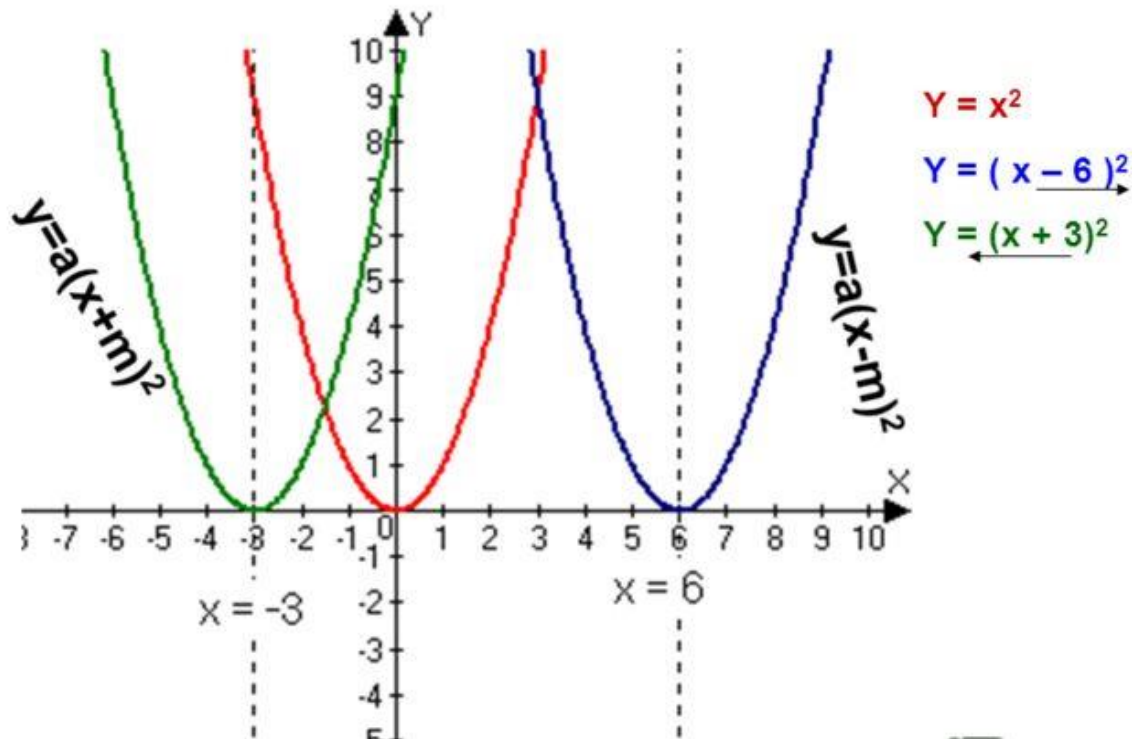
(c)



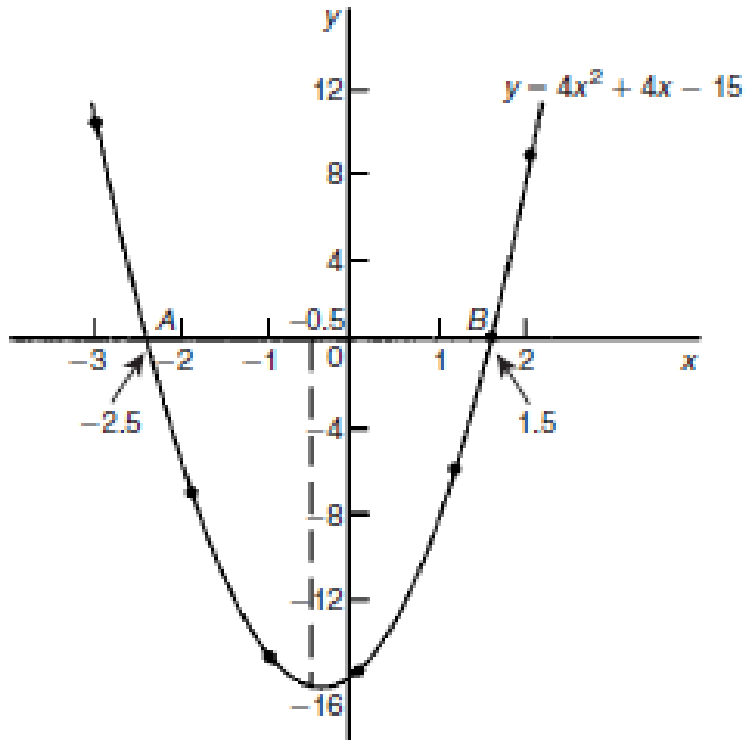
(d)

$$y = a(x + m)^2$$

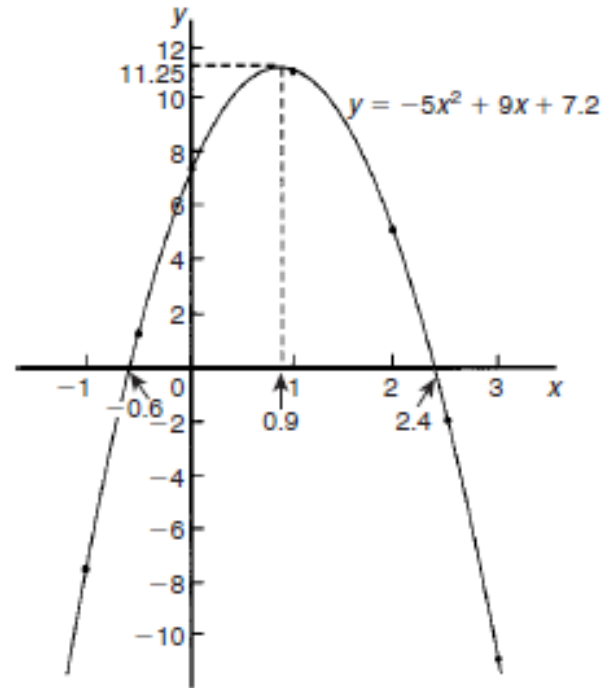
$$y = a(x - m)^2$$



$$y = a(x + m)^2 + k$$



$$y = 4\left(x + \frac{1}{2}\right)^2 - 16$$

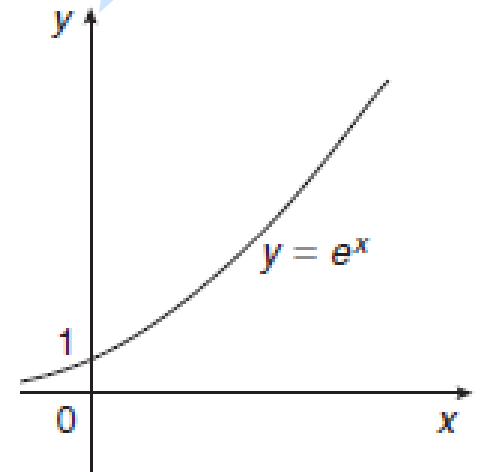
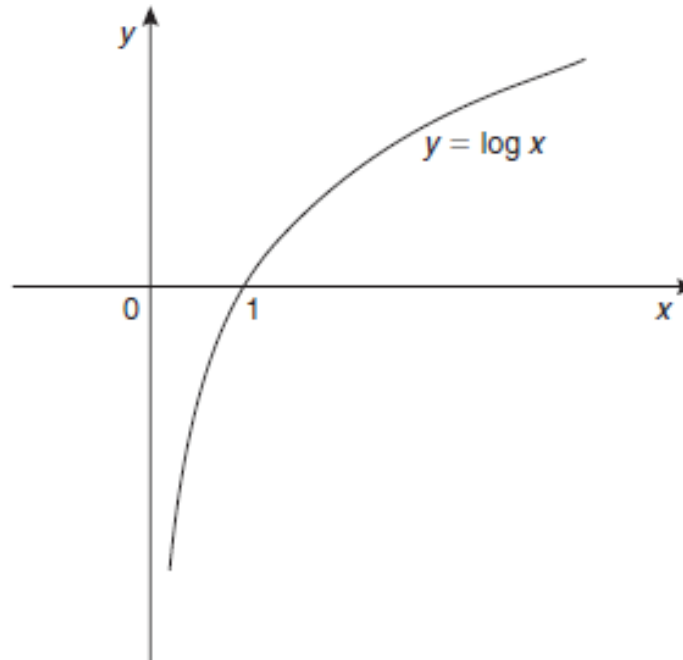
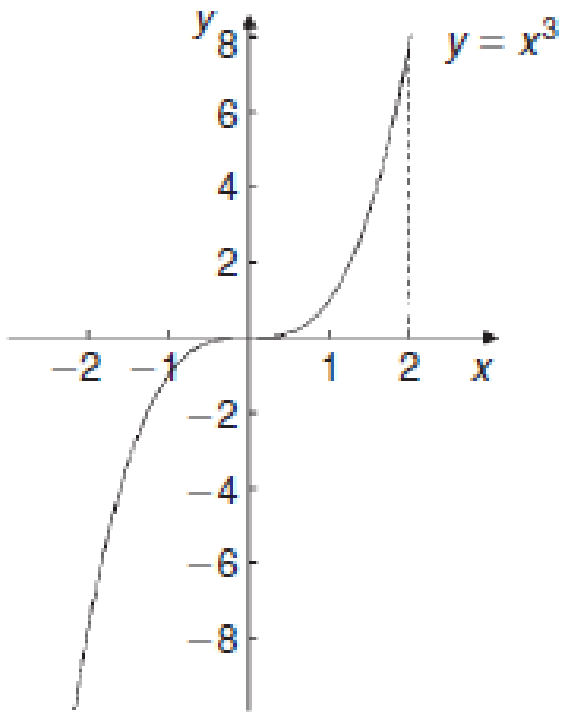


$$y = -5(x - 1.8)^2 + 23.4$$

Ko'rsatkichli funksiya

Logorifmik funksiya

Kubik parabola



# Sonli ketma-ketliklar tushunchasi

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

$$(1) f : n \rightarrow x_n, \quad (n=1, 2, 3, \dots)$$

akslantirishni qaraymiz.

**Ta'rif.** 1- akslantirishning akslaridan iborat ushbu

$$(2) x_1, x_2, x_3, \dots, x_n, \dots$$

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

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

$$x_n = (-1)^n : -1, 1, -1, \dots, (-1)^n, \dots$$

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

**(2) Sonli ketma-ketlik monoton o'suvchi deyiladi, agarda har bir  $n$  uchun quyidagi tengsizlik o'rinli bo'lsa**

$$x_{n+1} > x_n$$

**Masalan,  $x_n = \frac{n}{n+1}$ .**

**Sonli ketma-ketlik monoton kamayuvchi deyiladi, agarda har bir  $n$  uchun quyidagi tengsizlik o'rinli bo'lsa**

$$x_{n+1} < x_n$$

**Masalan,  $x_n = \frac{n}{n^2+1}$**

**2-sonli ketma-ketlikning  $x_n$  qiymati yuqoridagi shartlarni bajarmasa u holda, (2) ni monoton bo'lmagan ketma-ketlik deyiladi.**

**Masalan,  $\frac{1}{3}, -\frac{4}{9}, \frac{9}{27}, -\frac{16}{81}, \frac{25}{243}, \dots$**

(2) Sonli ketma-ketlik chegaralangan deyiladi, agarda shunday 2ta  $m$  va  $M$  sonlar mavjud bo'lsaki, barcha  $n$  lar uchun quyidagi tengsizlik o'rinli bo'lsa

$$m \leq x_n \leq M$$

Masalan,  $x_n = \frac{3n+2}{3n}$ ;  $1 < x_n \leq \frac{5}{3}$

# Foydalanilgan adabiyotlar

John Bird

- “Engineering mathematics”

N.S. Piskunov

- “Differensial va integral hisob”