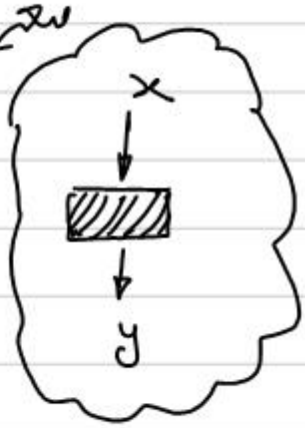
Functions

توابع

متغیر مستقل: x طول — تغییر

متغیر وابسته: y عرض — تابع



$y = f(x)$

ضابطه $y = x^2$

y	x
$y=4$	$x=2$
$y=9$	$x=3$

دسته‌بندی توابع

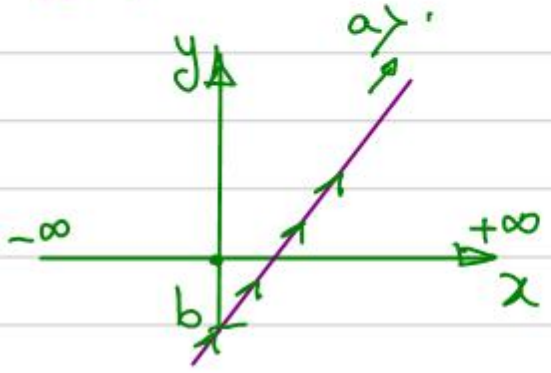
1) تابع چندجمله‌ای: $y = ax^n + bx^{n-1} + \dots + c$ (درجه n)

1-1) تابع ثابت (درجه صفر) $y=c$

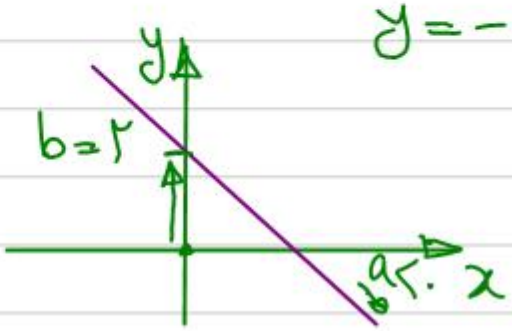
عرض از مبدأ

2-1) تابع خطی (درجه ۱) $y = \underline{a}x + \underline{b}$

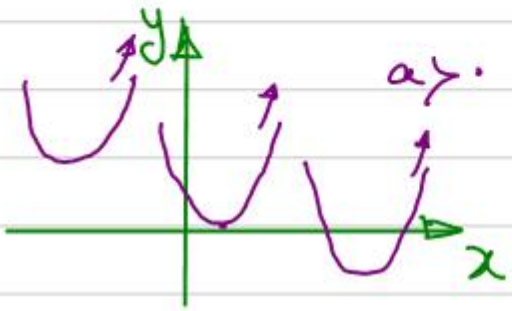
$y = x - ۲$



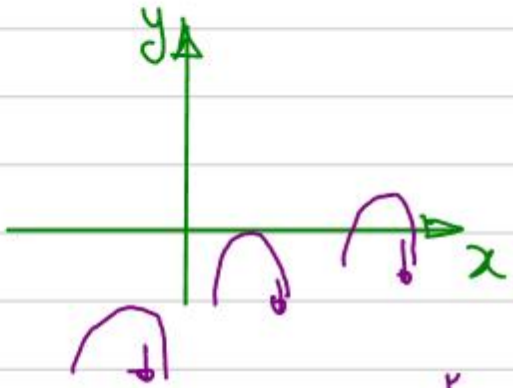
$y = -x + ۲$



۴-۱) تابع سهمی $y = ax^2 + bx + c$ ($a \neq 0$)

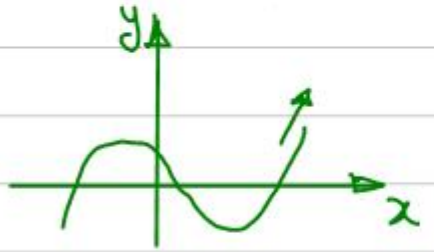


$y = x^2 - x + 2$

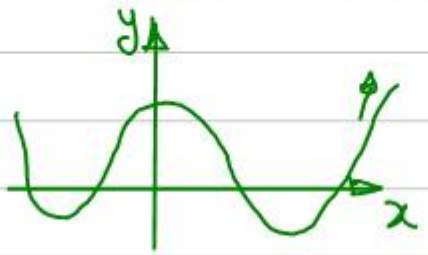


$y = -x^2 + 4$

$y = x^3 + 3x^2 - 2$



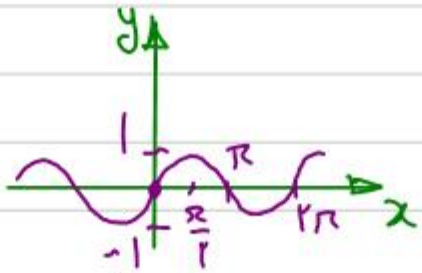
$y = x^4 - 3x^2 + 2x$



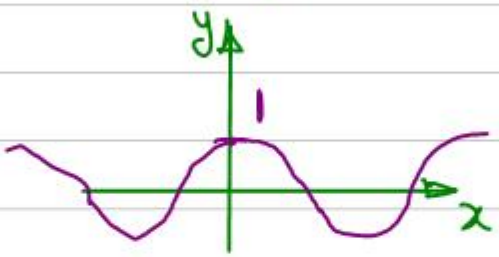
$y = -x^5 + 3x - 2$

۲) توابع مثلثاتی:

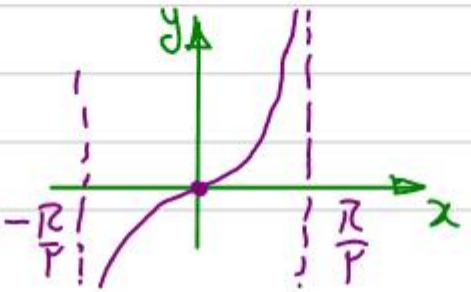
$y = \sin x$



$y = \cos x$



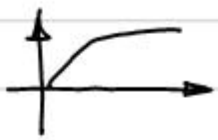
$y = \tan x$



۲-۱ معکوس مثلثاتی:

عدد: $2 \xleftrightarrow{\text{معکوس}} \frac{1}{2}$

تابع: $y = x^2$ (معکوس) $\not\Rightarrow$ $y = \frac{1}{x^2}$ $\Rightarrow$ $y = \sqrt{x}$



$\sin \frac{\pi}{2} = 1 \Rightarrow \text{ArcSin} 1 = \frac{\pi}{2}$

$\cos \frac{\pi}{2} = 0 \Rightarrow \text{Arccos} 0 = \frac{\pi}{2}$

۲-۲ توابع لگاریتمی:

$y = \log_a x$ $\quad \log_a 1 = 0$ $\quad \log_a a = 1$

$a > 1$

$y = \log_2 x$

$y = \log_{10} x = \log x$ (ضبط نشده)

$y = \log_e x = \ln x = \log x$ (ضبط نشده)

عدد نپر $e = 2.71828\ldots$

$e \simeq 2.7$

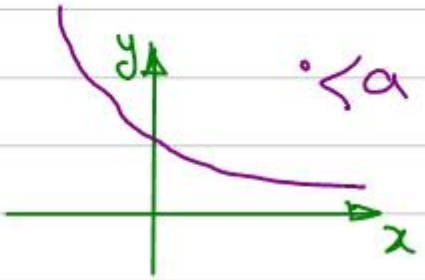
$0 < a < 1$

$y = \log_{\frac{1}{2}} x$ نزولی

F) تابع نمایی: $y = a^x$

$a > 1$

$y = 2^x$



$0 < a < 1$

$y = (\frac{1}{2})^x$

⊛ $y = e^x = Exp(x)$

F-1) تابع سیگموید: Sigmoid

$$y = \frac{1}{1+e^{-x}}$$

۵) تابع هایپربولیک (hyperbolic):

$$\cosh x = \frac{e^x + e^{-x}}{2}$$

$$\sinh x = \frac{e^x - e^{-x}}{2}$$

$$\tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$