# 1

# 函数与极限

## 1.1 映射与函数

### 映射{x}→{y}

定义：两个非空集合$X$、$Y$，若存在法则 $f$，使$X$中每个元素$x$在$Y$中都能确定唯一元素$y$与之对应，则称 $f$为$X$到$Y$的映射，记作$f$：$x \to y$

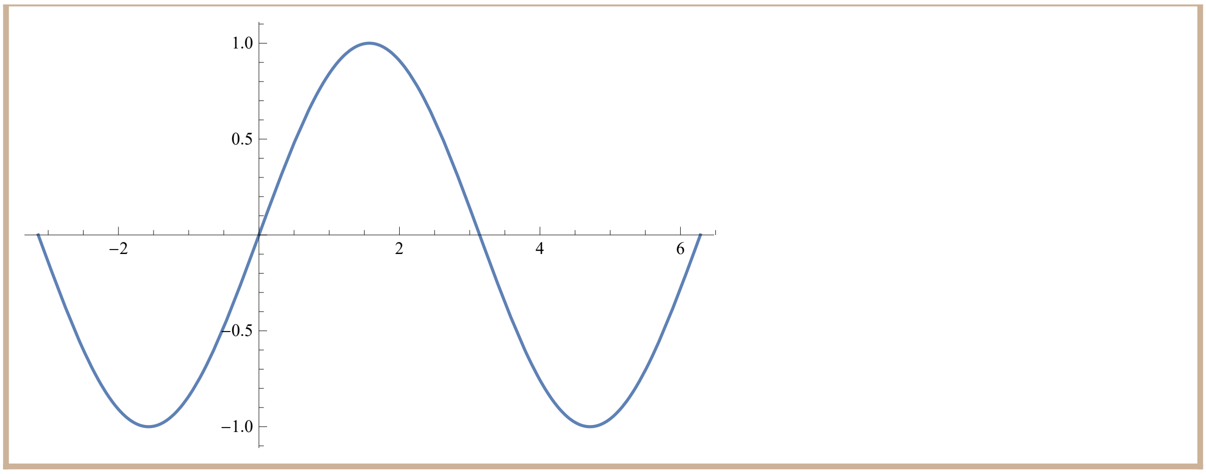
- X:{0,1,2,3}→Y:{0,2,4,6};有 f：x→y 即 y=f[x]=2x

### 函数y=f[x]

定义：数集 $D \subset R$,则称映射 $f: D \to R$为定义在 $D$上的函数，记为 $y=f(x)$，$x \in D$, $x$为自变量，$y$为因变量，$D$为定义域

- f(x)=Sin(x), x∈[-π,2π];

```
Plot[Sin[x],{x,-π,2π}]
```

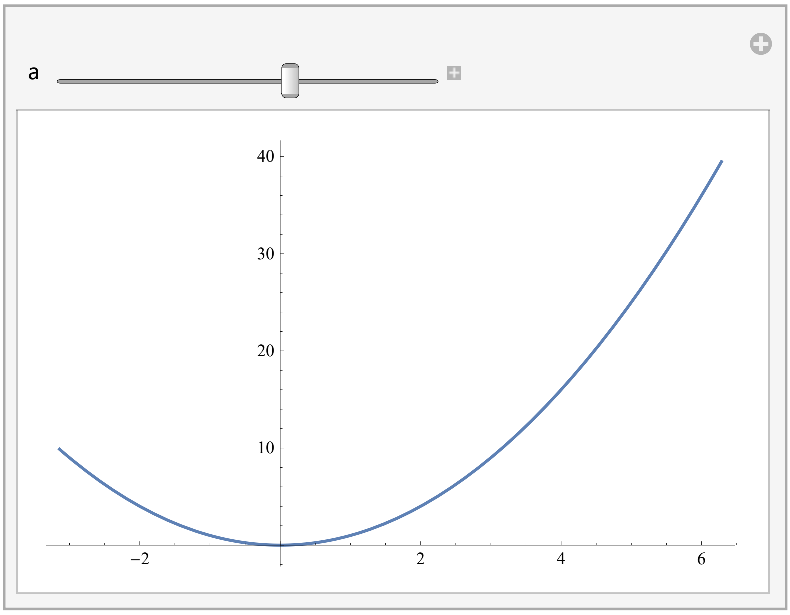



### 基本初等函数

- 幂函数

- f[x] = $x^a$, x ∈ [-π, 2 π];

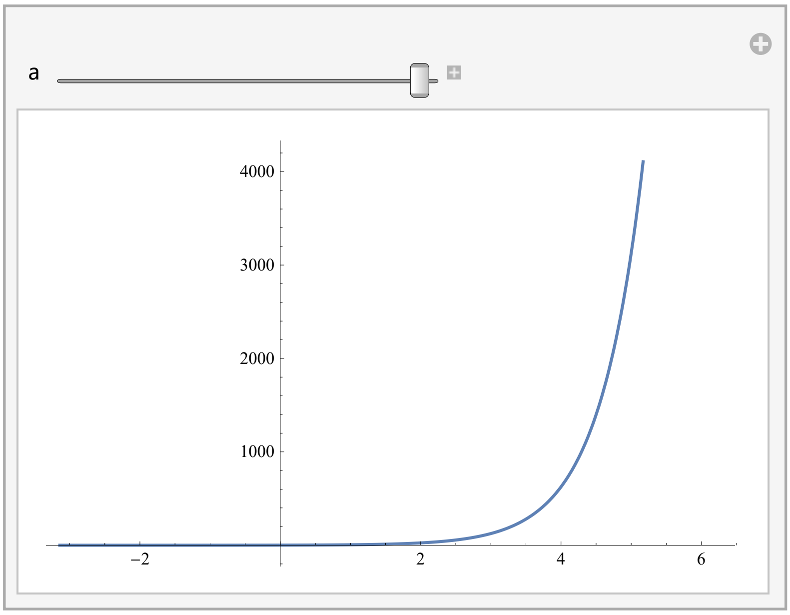
```
Manipulate[Plot[x^a,{x,-π,2π}],{a,-3,5,1}]
```




■ 指数函数

- f[x] = $a^x$, x ∈ [-π, 2 π];

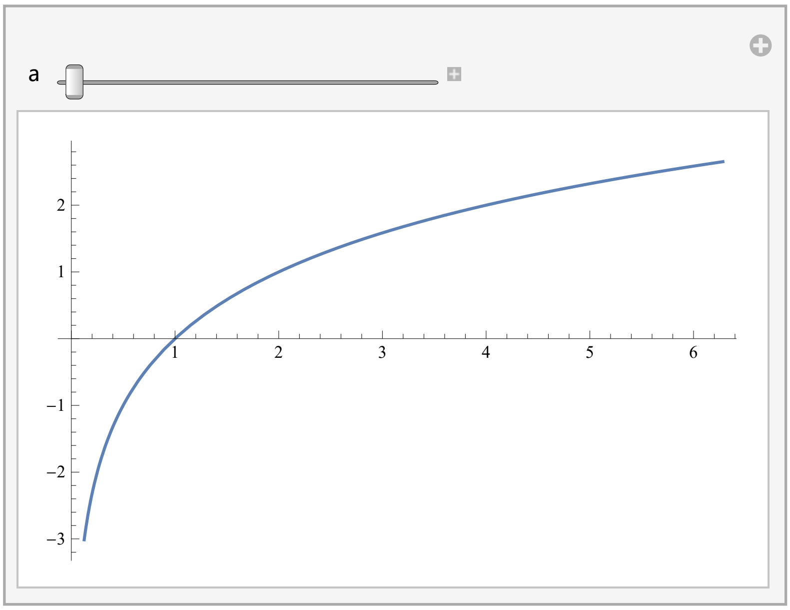
```
Manipulate[Plot[a^x,{x,-π,2π}],{a,1,5,1}]
```




■ 对数函数

- f[x] = $\mathrm{Log}_a$ x, x ∈ [0, 2 π];

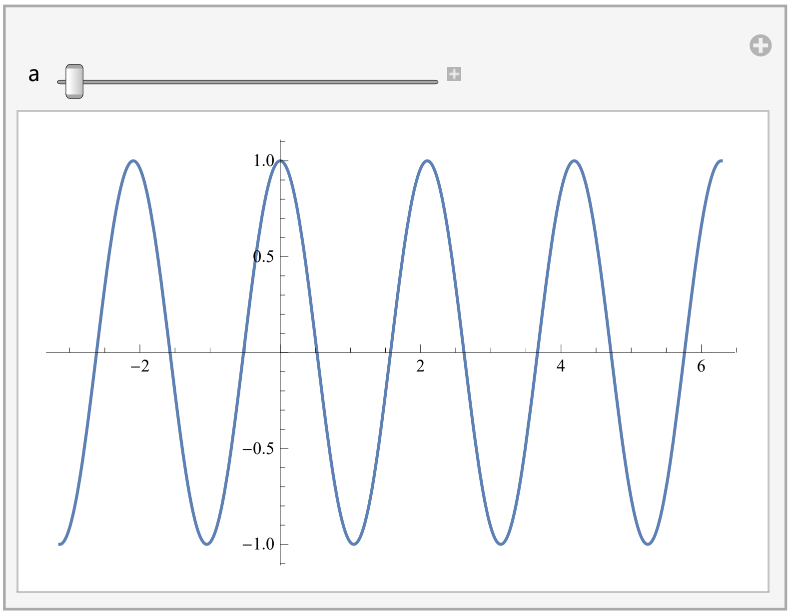
```
Manipulate[Plot[Log[a,x],{x,0,2π}],{a,2,6,1}]
```




- 三角函数

  - f[x]=Cos[a x], x∈[-*π*,2*π*];

```
Manipulate[Plot[Cos[a x],{x,-π,2π}],{a,-3,3}]
```




- 反三角函数

  - f[x]=ArcSin[a x], x∈[-*π*,2*π*];

```
Manipulate[Plot[ArcSin[a x],{x,-π,2π}],{a,-3,3}]
```