

# Assignment 3

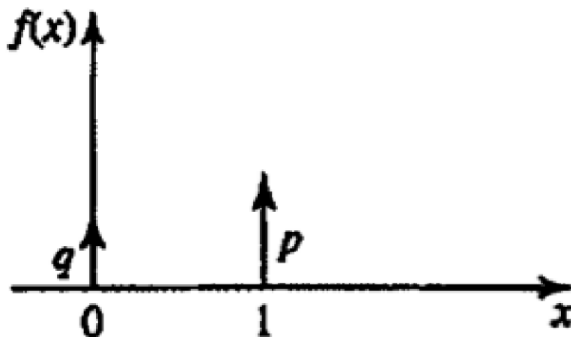
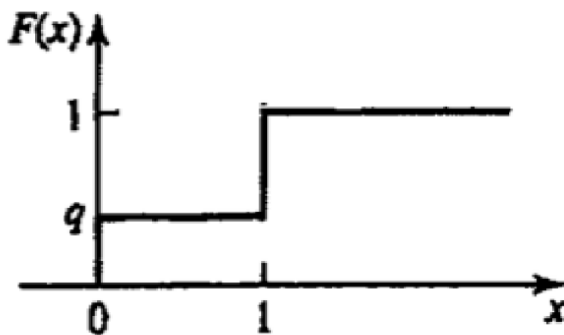
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In the coin-tossing experiment, the probability of heads equals  $p$  and the probability of tails equals  $q$ . We define the random variable  $x$  such that

$$x(h)=1, x(t)=0$$

We shall find its distribution function  $F(x)$  for every  $x$  from  $-\infty$  to  $\infty$ .

**Solution:**



If  $x \geq 1$ , then  $x(h)=1 \leq x$  and  $x(t)=0 \leq x$ .

Hence  $F(x)=P\{x \leq x\} = P(h,t)=1, x \geq 1$

If  $0 \leq x < 1$ , then  $x(h)=1 > x$  and  $x(t)=0 \leq x$ . Hence

$F(x)=P\{x \leq x\} = P\{t\}=q, 0 \leq x < 1$ .

If  $x < 0$ , then  $x(h)=1 > x$  and  $x(t)=0 > x$ . Hence,

$F(x)=P\{x \leq x\}=0, x < 0$