GENERAZIONE di variabili aleatorie Metodo dell'INVERSIONE

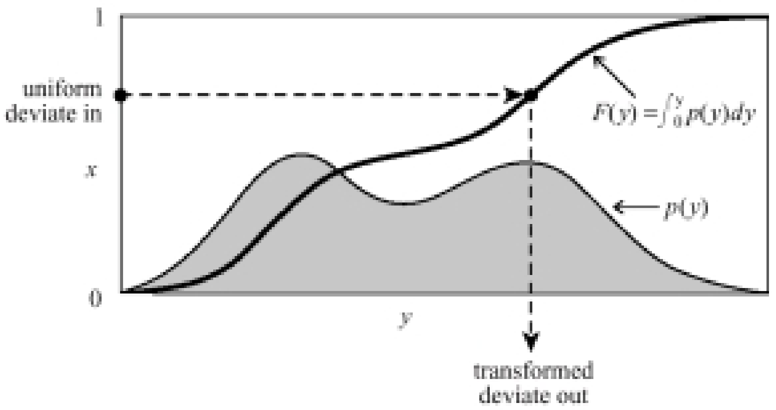

Figure 7.2.1. Transformation method for generating a random deviate y from a known probability distribution $p(y)$. The indefinite integral of $p(y)$ must be known and invertible. A uniform deviate x is chosen between 0 and 1. Its corresponding y on the definite-integral curve is the desired deviate.

GENERAZIONE di variabili aleatorie con DISTRIBUZIONE GAUSSIANA

$$p(y)dy = \frac{1}{\sqrt{2\pi}} e^{-y^2/2} dy$$

$$y_1 = \sqrt{-2 \ln x_1} \cos 2\pi x_2$$

$$y_2 = \sqrt{-2 \ln x_1} \sin 2\pi x_2$$

$$x_1 = \exp\left[-\frac{1}{2}(y_1^2 + y_2^2)\right]$$

$$x_2 = \frac{1}{2\pi} \arctan \frac{y_2}{y_1}$$

$$R^2 \equiv v_1^2 + v_2^2$$

Sen $= v_1/\sqrt{R^2}$

Cos$= v_2/\sqrt{R^2}$

```
      FUNCTION gasdev(idum)
      INTEGER idum
      REAL gasdev
C     USES ran1
         Returns a normally distributed deviate with zero mean and unit variance, using ran1(idum)
         as the source of uniform deviates.
      INTEGER iset
      REAL fac,gset,rsq,v1,v2,ran1
      SAVE iset,gset
      DATA iset/0/
      if (idum.lt.0) iset=0                         Reinitialize.
      if (iset.eq.0) then                           We don't have an extra deviate handy, so
1         v1=2.*ran1(idum)-1.                       pick two uniform numbers in the square extend-
          v2=2.*ran1(idum)-1.                          ing from -1 to +1 in each direction,
          rsq=v1**2+v2**2                           see if they are in the unit circle,
          if(rsq.ge.1..or.rsq.eq.0.)goto 1          and if they are not, try again.
          fac=sqrt(-2.*log(rsq)/rsq)                Now make the Box-Muller transformation to get
          gset=v1*fac                                  two normal deviates. Return one and save
          gasdev=v2*fac                                the other for next time.
          iset=1                                    Set flag.
      else                                          We have an extra deviate handy,
          gasdev=gset                               so return it,
          iset=0                                    and unset the flag.
      endif
      return
      END
```

GENERAZIONE di variabili aleatorie Metodo dello scarto

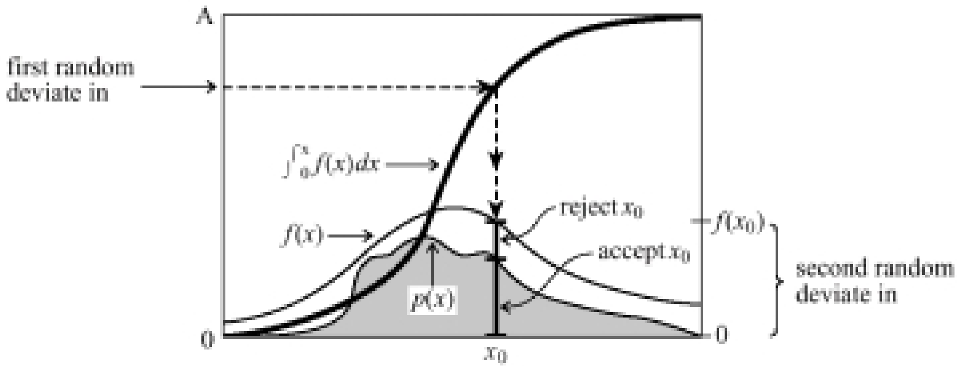

Figure 7.3.1. Rejection method for generating a random deviate x from a known probability distribution $p(x)$ that is everywhere less than some other function $f(x)$. The transformation method is first used to generate a random deviate x of the distribution f (compare Figure 7.2.1). A second uniform deviate is used to decide whether to accept or reject that x. If it is rejected, a new deviate of f is found; and so on. The ratio of accepted to rejected points is the ratio of the area under p to the area between p and f.