

## Chapter 6

6.1

a) Let  $X$  be a random variable with distribution  $U(0,1)$ .

To simulate a die, create a discrete random variable  $Y = 1 + \text{floor}(x*6)$

b) Another way of doing part a)

6.3

Let  $X = 1-U$ . Let  $x$  be in the interval  $[0,1]$  Consider  $u = 1-x$  and observe that  $u$  is in  $[0,1]$  if and only if  $x$  is in  $[0,1]$ . Therefore,  $P(X = x) = P(U = 1-x) = 1$ . Therefore  $X$  is uniformly distributed between 0 and 1.

6.6

Reversing the process of generating an exponential distribution from a uniform distribution, we would take the values  $x$  from the  $\text{Exp}(2)$  random number generator and apply them to the formula  $u = 1 - \exp(-2x)$  to get  $U(0,1)$ .

6.8

Finding the inverse of the function

$$u = 1 - 1/(x^3)$$

gives us  $1-u = 1/(x^3)$

$$1/(1-u) = x^3$$

or  $x = [1/(1-u)]^{1/3}$  for  $u$  in  $[0, 1)$ .

Since  $1-u$  is also uniformly distributed, we could also write

$$x = [1/u]^{1/3} \text{ for } u \text{ in } (0,1].$$