2.10 Univariate random numbers

Ignoring constants:
(a) function $2x^3$:

$$\alpha(x) = x^4$$
$$x = f^{-1}\alpha = \alpha^{1/4}$$

(b) function $L^{-\gamma}$, γ positive:

$$\alpha(x) = x^{1-\gamma}$$
$$x = f^{-1}\alpha = \alpha^{\frac{1}{1-\gamma}}$$

To implement in Fortran using the *Numerical Recipes* routine *ran1*:

```
(a) x = ran1(idum)**(1./4.)
(b) x = ran1(idum)**(1./(1.-g))
```

where *ran1* is the *Numerical Recipes* function for generating random numbers in the interval 0 - 1.0, *idum* is the seed, and g = γ.

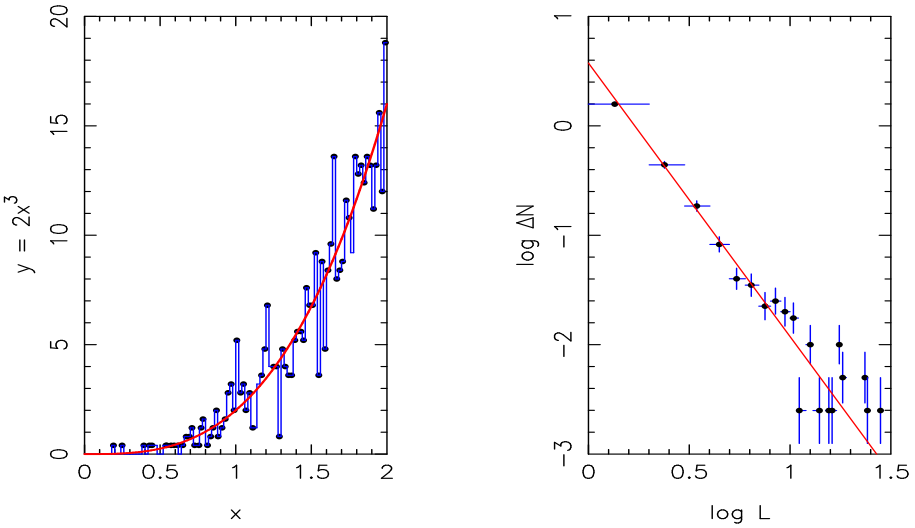

Figure 1: Univariate random numbers. Left - the function $2x^3$ over the range 0 - 2, with 1000 random numbers drawn according to (a) above, linear axes. Right - the (luminosity?) function $dN(L) = L^{-2.5}dL$, with 1000 random numbers drawn according to (b) above, logarithmic axes.

You will find the hardest part of this exercise is making histograms and axes, and in getting samples into the right bins.