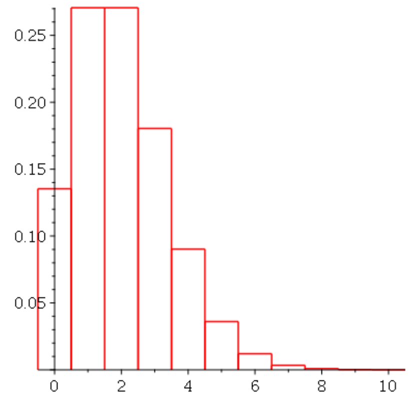

Figure 1: The probability histogram

The plot above shows the probability histogram for a *Poisson* random variable Y with $\lambda = 2$. The heights of the bars are

$$
\begin{array}{ll}
P(X=0) = \dfrac{2^0 e^{-2}}{0!} \doteq .1353 & P(X=1) = \dfrac{2^1 e^{-2}}{1!} \doteq .2707 \\
P(X=2) = \dfrac{2^2 e^{-2}}{2!} \doteq .2707 & P(X=3) = \dfrac{2^3 e^{-2}}{3!} \doteq .1804 \\
P(X=4) = \dfrac{2^4 e^{-2}}{4!} \doteq .0902 & P(X=5) = \dfrac{2^5 e^{-2}}{5!} \doteq .0361 \\
P(X=6) = \dfrac{2^6 e^{-2}}{6!} \doteq .0120 & P(X=7) = \dfrac{2^7 e^{-2}}{7!} \doteq .0034 \\
P(X=8) = \dfrac{2^8 e^{-2}}{8!} \doteq .0009 & P(X=9) = \dfrac{2^9 e^{-2}}{9!} \doteq .0002 \\
P(X=10) = \dfrac{2^{10} e^{-2}}{10!} \doteq .00004 &
\end{array}
$$

In this case, unlike the binomial probability histogram, the total area of these boxes is not exactly one. In fact the sum of the areas of these 11 boxes is .9999916916, slightly less than 1. The reason is that

$$P(Y=k) = \frac{2^k e^{-2}}{k!} > 0$$

for all $k \geq 0$.