In [1]:
```
options(repr.plot.width=4, repr.plot.height=4) #Something to modify the size of the plot
```

Question 2: What is the probability that the system fails before 70 hours based on your cdf in Question 1?

In [2]:
```
cdf = function(y){1-exp(-(3*y)/80)}
cat(round(cdf(70),4)*100,"%")
```

```
92.76 %
```

Question 3:Generate a random sample of size 10,000 for the lifetime of System 1

i) Draw a histogram representing the probability density of the sample. On top of the histogram, draw the pdf calculated in Question 1. Does the probability density of the sample follow similar pattern as the pdf?

ii) Estimate the probability that the system fails before 70 hours using the sampled data. Is the result close to the true probability value?

i)

In [3]:
```
n = 10000

A = rexp(n, rate = 1/80)
B = rexp(n, rate = 1/80)
C = rexp(n, rate = 1/80)

#I copy it 3 times with the expectation that the random element will make them different
#Despite the same parameters

Y = cbind(A,B,C)
head(Y)

Y1 = apply(Y,1,min)
head(Y1)
```

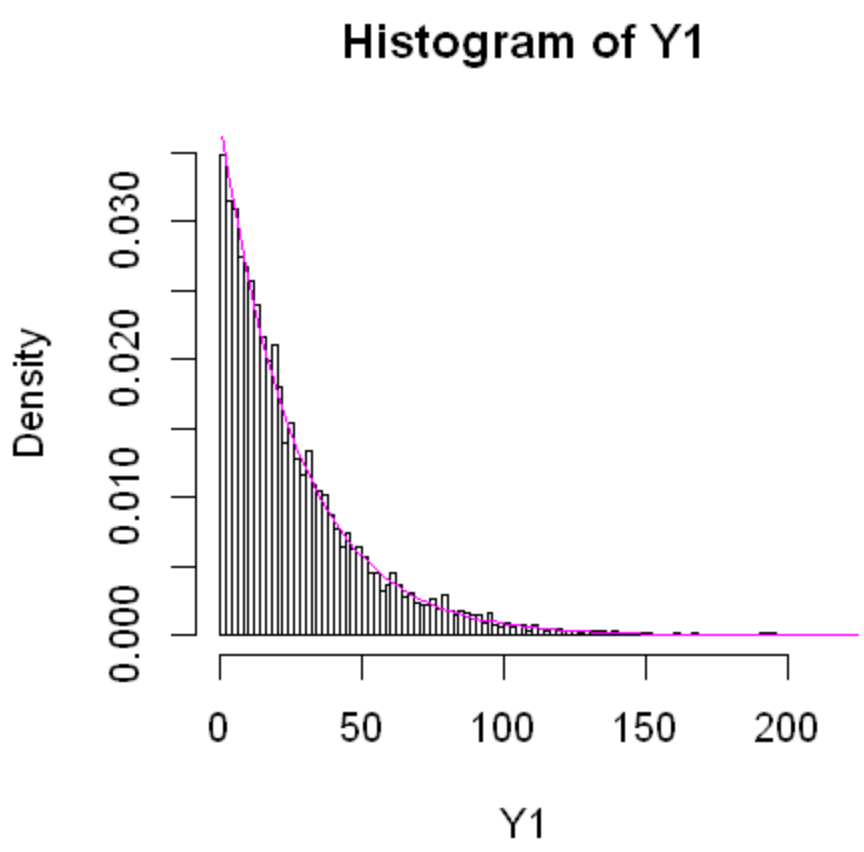
A	B	C
56.97403	162.030840	11.463573
64.45959	3.443281	7.140519
21.21353	61.099096	45.794849
138.54030	30.080904	79.072207
105.47026	46.590513	6.061617
16.62177	11.285458	58.171659

1. 11.4635729789734
2. 3.44328138977289
3. 21.2135274831955
4. 30.0809041038156
5. 6.06161680072546
6. 11.285457611084

In [4]:
```
#First, let's get the PDF function up and running
pdf = function(y){(3/80) * exp(-3*y/80)}

#Now the histogram
hist(Y1, prob=TRUE, breaks = 100)

#Now the curve
curve(pdf, from = 0, to = 300, add=TRUE, col = "Magenta")
```



In [5]:
```
cat(round(sum(Y1<70)/n,4)*100,"%")
```

```
92.47 %
```

And yes, it fits beautifully!