We will now investigate numerically the probability that a bootstrap sample of size $n = 100$ contains the j-th observation. Here $j = 4$. We repeatedly create bootstrap samples, and each time we record whether or not the fourth observation is contained in the bootstrap sample

Solution to (h)

```
In [1]:  srand(110104) # set the seed
         n = 100 # total number of observations
         j = 4 # we want to see if j is in the sample
         store = Array{Bool}(n) # preallocate space
         for i in 1:n
             store[i] = j ∈ rand(1:n, n)  # is j contained?
         end
         mean(store)
```

```
Out[1]:  0.65
```

Solution to (g), the optional question

```
In [19]:  # added the log to have a little bit more stability
          prob(n) = (1 - 1/n)^n
          # sequence to evaluate
          prob_seq = [prob(i) for i in 1:100]
          ;
```

In [20]:
```
# plotting
using Plots
plot(1:n, [prob_seq],
    xlab = "sample size",
    label = "Prob(j ∉ sample)",
    lw = 2,
    size = (600, 300))
plot!([exp(-1)],
    st = [:hline],
    label = "exp(-1)",
    ls = :dot, lw = 3)
```

Out[20]: