Joseph High
Hopkins ID: 9E1DC

R Code for part (d)

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> #Problem 2.20, Part (d)
>
> f<-function(x, a=1){exp(-x)/(1-exp(-a))} #defining the truncated
exponential function
> g<-function(x){dexp(x, rate=1)}
> set.seed(1)
> n=20000  #number of sample points to generate
> prop.func<-rexp(n)  #generating exponentially distributed random
variables
> U<-runif(n)  #generating uniform random variables
> C<-1/(1-exp(-1)) #optimal C from part (b)
> U.a<- U < f(prop.func)/(C*g(prop.func))
> accept<-prop.func[U.a]  #accepted points
> proportion<-length(accept)/n  #Proportion is 1 since the f and C*g
cancel out when a=1.
> x.accept<-sort(accept)
> x<-seq(-10,10, by=0.1)
> hist(x.accept, xlim=c(0, 10), prob=T, main = "Histogram with Trunc
Exp Overlay")
> lines(x, f(x), col="blue")
>
> #The proportion of accepted points is 1 when a=1. This can also be
seen in the histogram plot.
> #The true truncated exponential distribution function lies over the
histogram, suggesting that
> #it has accepted all points. The theoretical proportion of accepted
points is 0.632
> #(the efficiency). However, when this theoretical proportion is
computed, it is being computed
> #for all values of a. Here, we are only considering a=1 and this
value of a along with the
> #optimal value of C results in the proposal function*C = truncated
exponential function.
> #Hence, the proportion of 1.
```

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