is604hw4test

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e. Importance Sampling To pick a function here, I wanted to use an upside-down parabola that crossed the x-axis at -5 and 5, which would be $\frac{-3(x-5)(x+5)}{500}$

This would be difficult to solve for an inverse transform, so lets sample from it using acceptance/rejection.

The max of my parabola is at 0.15, and cofx(0,1) (the normal distribution's maximum) is 0.3989. So, I can safely say:

$$\frac{f(x)}{g(x)} \leq \frac{0.15}{0.1} \leq 1.5$$

So, to sample from f(x), I'll generate y from g(x), generate a random u from Uniform(0,1), and accept y if $U < \frac{f(y)}{cg(y)}$

```
n <- 100000
k <- 0
j <- 0
y <- numeric(n)

while(k < n){
  u <- runif(1)
  j <- j+1
  x <- runif(1,min=-1,max=1)
  if(x^2 > u){
    k <- k+1
    y[k] <- x
  }
}

hist(y)
```

Histogram of y