Statistical Computing Project 1

Mario Ibanez

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Constants

```
# knitr library
library(knitr)
comparison_value <- 1.6276/sqrt(1000)
```

Generator

```
# Generates 1000 values from standard normal with given seed
generator <- function(seed, multiplier=16807, mod=2147483647, N=1000, sorted=TRUE){
  # Initialize vector
  vector <- c(rep(0, times=N))
  vector[1] <- seed %% mod
  # Loop to create rest of the vector
  for(i in 2:N){
    vector[i] <- (multiplier * vector[i-1]) %% mod
  }
  # Divide values so they're between (0,1), return
  vector <- sort(vector/mod)
  return(vector)
}
```

Comparison Dataframe

```
# Sn(x) values to compare against F(x) = x
comparison_Snx <- data.frame(low=seq.int(0, 999)/1000,
                         high=seq.int(1,1000)/1000)
```

Kolmogrov Test

```
kolmogrov <- function(random_vec, comp_value=comparison_value){
  max_difference <- max(max(abs(random_vec - comparison_Snx$low)),
                        max(abs(random_vec - comparison_Snx$low)))
  if(max_difference < comp_value){
    return (TRUE)
  } else {
    return (FALSE)
  }
}
```

Test Sequences

```
table(apply(mapply(generator, seed=1:10^3), MARGIN = 2, FUN = kolmogrov))
```

```
##
## FALSE  TRUE
##     6   994
```

part 2

- what percentage of the 2 billion seeds fail the test when n=1000 ?
  (take a random (as large as possible) sample and make a confidence inteval for this percentage)