1. Consider a tournament with the following prize structure:

|  |  |
| --- | --- |
| Number of wins | Payoff (in dollars) |
| 0 | 1.45 |
| 1 | 1.72 |
| 2 | 2.24 |
| 3 | 2.76 |
| 4 | 3.55 |
| 5 | 4.6 |
| 6 | 5.65 |
| 7 | 6.75 |

You play in the tournament until you get three losses or 7 wins.

Make a graph of the expected value of the tournament (on the y-axis) vs. the probability of winning each game (on the x-axis). If the tournament costs $3.75, at what win percentage does the expected value exceed the cost of the tournament? (Plot $3.75 as a horizontal line ranging from 0 to 1).

(hint: Calculate the probability of 7 wins a 1 – sum(prob of all other outcomes)).

(2) Generate a simulated dataset in which the variance is a function of the mean but the null hypothesis of differential expression is always true. The following code will accomplish this:

rm(list=ls())

numRows = 3000

numCols = 20

for( i in 1:numCols)

myFrame <- data.frame(1:numRows)

#initiate the data.frame with the correct # of rows to suppress error messages.

#likely, there are much better ways to do this!

names(myFrame)[1] <- "tempColumn"

for( i in 1: numCols)

{

vals <- vector(length=numRows)

for( j in 1:numRows)

{

aMean = j /10

aMean = max( aMean,5)

aVar = aMean+ 5\* aMean

aVal = round( max( rnorm(1,mean=aMean,sd=sqrt(aVar)), 1))

vals[j] = aVal

}

colName <- paste( "sample" , i ,sep="")

myFrame[[colName]] = vals

}

myFrame["tempColumn"] <- NULL

row.names(myFrame) <- paste("Gene\_",1:numRows,sep="")