Fall2016Homework02FundOfFunds.R

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```r
# E[h'r] = (1/n) sum_i E[r.i] = beta E[r.M] + (1/n) sum_i E[r.i]
# V[h'r] = V[ sum_i (1/n) (beta r.M + r.i) ]
      # = V[ beta r.M + (1/n) sum_i r.i ]
      # = beta^2 sigma.M^2 + V[ (1/n) sum_i r.i ], can do b/c two terms are independent
      # = beta^2 sigma.M^2 + n^(-2) sum_i sigma.i^2

beta <- 0.5
sigma.M <- 0.2
sigma.i <- 0.03

fracVar <- function(n) {
    f <- beta^2 * sigma.M^2
    g <- n^(-2) * n * sigma.i^2
    f/(f+g)
}

Er.M <- 0.07
Er.i <- 1.5 * sigma.i

sharpe <- function(n) {
  E <- beta * Er.M + (1/n) * n * Er.i
  Sigma <- sqrt(beta^2 * sigma.M^2 + n^(-2) * n * sigma.i^2)
  E / Sigma
}

N <- 2:30
library(ggplot2)
print(qplot(N,sharpe(N)) + theme_bw())
```