Thought Experiment 1

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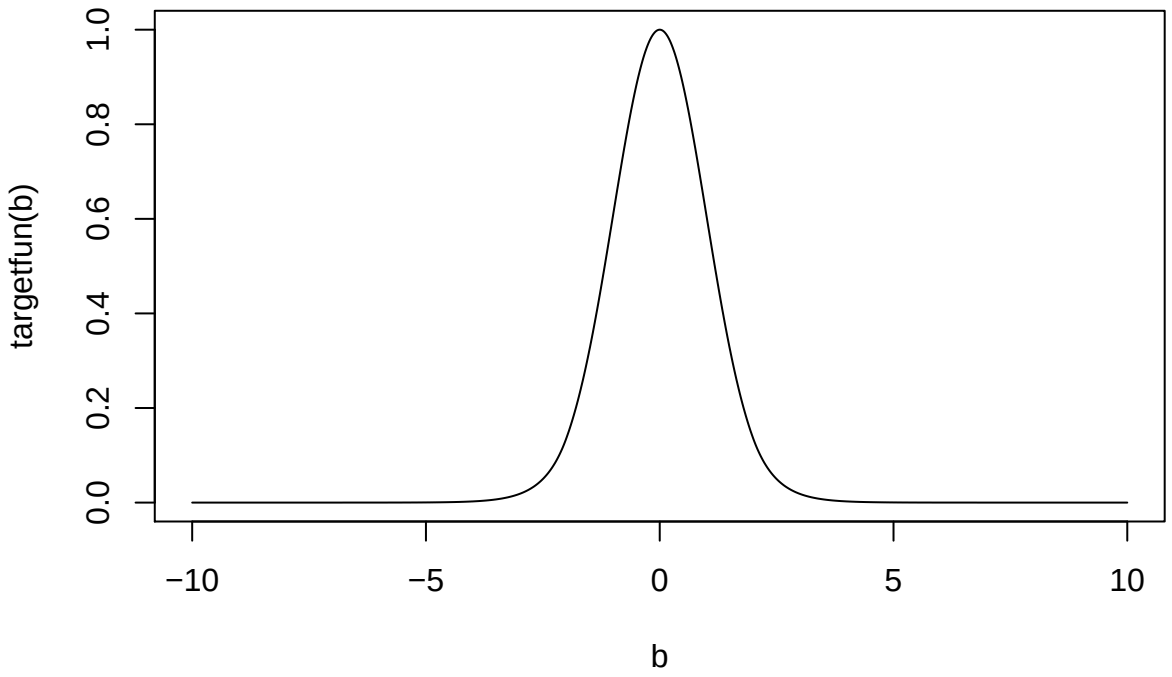
5/7/2019

Target function

```
b         = seq(-10,10,0.01)
targetfun = function(b, lambda = 2){
  out                   = double(length(b))
  out[abs(b) < lambda]  = (b[abs(b) < lambda])^2 / 2
  out[abs(b) >= lambda] = abs(b[abs(b) >= lambda]) * lambda - lambda^2/2
  exp(-out)
}
plot(b, targetfun(b), t = "l")
```



Uniform mixture approximation

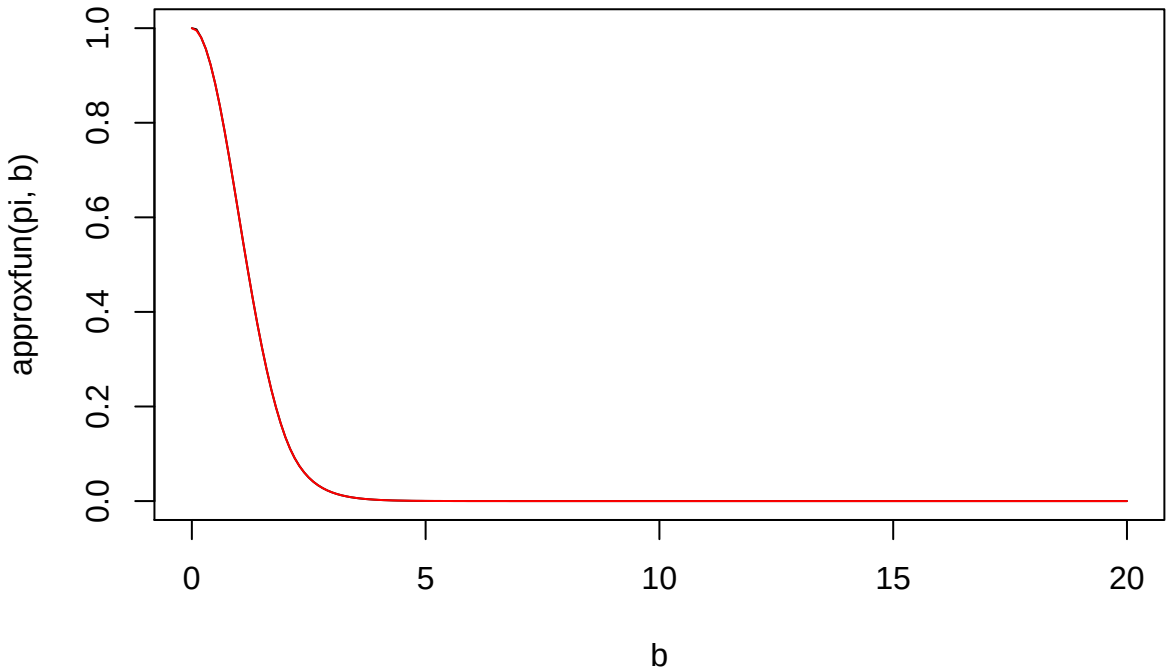
```
library(ashr)
b         = seq(0,20,0.1)
n         = length(b)
X         = matrix(0,n,n)
X[upper.tri(X, diag = TRUE)] = 1
X         = t(t(X) / b / 2)[,-1]
X[1:10,1:10]
```

```
##       [,1] [,2]     [,3] [,4] [,5]      [,6]      [,7]  [,8]      [,9]
##  [1,]    5  2.5 1.666667 1.25    1 0.8333333 0.7142857 0.625 0.5555556
##  [2,]    5  2.5 1.666667 1.25    1 0.8333333 0.7142857 0.625 0.5555556
```

```
##  [3,]    0  2.5 1.666667 1.25    1 0.8333333 0.7142857 0.625 0.5555556
##  [4,]    0  0.0 1.666667 1.25    1 0.8333333 0.7142857 0.625 0.5555556
##  [5,]    0  0.0 0.000000 1.25    1 0.8333333 0.7142857 0.625 0.5555556
##  [6,]    0  0.0 0.000000 0.00    1 0.8333333 0.7142857 0.625 0.5555556
##  [7,]    0  0.0 0.000000 0.00    0 0.8333333 0.7142857 0.625 0.5555556
##  [8,]    0  0.0 0.000000 0.00    0 0.0000000 0.7142857 0.625 0.5555556
##  [9,]    0  0.0 0.000000 0.00    0 0.0000000 0.0000000 0.625 0.5555556
## [10,]    0  0.0 0.000000 0.00    0 0.0000000 0.0000000 0.000 0.5555556
##       [,10]
##  [1,]   0.5
##  [2,]   0.5
##  [3,]   0.5
##  [4,]   0.5
##  [5,]   0.5
##  [6,]   0.5
##  [7,]   0.5
##  [8,]   0.5
##  [9,]   0.5
## [10,]   0.5
```

```
library(MASS)
pi = c(0,ginv(X) %*% targetfun(b))
```

```
approxfun = function(pi, b){
  out    = rev(cumsum(0.5 * rev(pi/b)))
  out[1] = 1
  out
}
plot(b, approxfun(pi,b), t = "l");
lines(b, targetfun(b), col = 2)
```




```
plot(b, pmax(abs(b) - 2, 0) * sign(b), t = "l", xlim = c(0,10), ylim = c(0,10))
for (i in 1:5) {
```

```
  c          = i
  b2         = get_pm(ash(b,1/sqrt(c), g = unimix(pi,-b/c, b/c), fixg=TRUE))
  lines(b, b2, col = i+1)
}
```

```
## Warning in qvalue[o] <- (cumsum(sort(lfdr))/(1:sum(!is.na(lfdr)))): number
## of items to replace is not a multiple of replacement length

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