

GroupProject1

Q2

```
library("lpSolve")
maturityYear = c(1,2,2,3,4,5,5,6,7,8)
# Price of each bond
c = c(102,99,101,98,98,104,100,101,102,94)
# Coupon rate
coupon = c(5,3.5,5,3.5,4,9,6,8,9,7)
# Liability schedule
b = c(12000,18000,20000,20000,16000,15000,12000,10000)
dir = rep("=",8)

# Matrix of cash flow from coupon
couponTol = matrix(0,8,10)
for(i in 1:10){
  couponTol[1:maturityYear[i], i] = 1
}
couponTol = couponTol %*% diag(coupon)

# Matrix of cash flow from principle at maturity
maturityTol = matrix(0,8,10)
for(i in 1:10){
  maturityTol[maturityYear[i],i] = 100
}

# Total cash inflows
A = couponTol + maturityTol

s = lp("min",c,A,dir,b)
s$solution

## [1] 62.13613 0.00000 125.24293 151.50508 156.80776 123.08007 0.00000
## [8] 124.15727 104.08986 93.45794
```

Q3

```
dedication <- function(P,C,M,L){

  t = length(L)
  n = length(M)

  couponTol = matrix(0,t,n)
  for(i in 1:10){
    couponTol[1:M[i],i] = 1
  }
  couponTol = couponTol %*% diag(C)

  maturityTol = matrix(0,t,n)
  for(i in 1:10){
```

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    maturityTol[j = M[i],i] = 100
  }

  dir = rep("=",t)
  s = lp("min",P,couponTol + maturityTol,dir,L)
  if (s$status ==0){
    return(s$solution)
  }
  # Catch Exceptions
  else(
    print("No feasible solution found")
  )
}

# Test the function with Q2
dedication(c,coupon,maturityYear,b)

## [1] 62.13613 0.00000 125.24293 151.50508 156.80776 123.08007 0.00000
## [8] 124.15727 104.08986 93.45794

# Test with exception case
maturityYear = rep(1,10)
coupon = rep(0,10)
dedication(c,coupon,maturityYear,b)

## [1] "No feasible solution found"

## [1] "No feasible solution found"

Q4

library(rvest)

## Loading required package: xml2

## Warning: package 'xml2' was built under R version 3.3.2

library(XML)

##
## Attaching package: 'XML'

## The following object is masked from 'package:rvest':
##
## xml

url = "http://online.wsj.com/mdc/public/page/2_3020-treasury.html"
table = readHTMLTable(url, header=T, which=3,stringsAsFactors=F)
table$Date <- as.Date(table$Maturity, format="%m/%d/%Y")
table$year = format(table$Date,"%Y")
table$monthday = format(table$Date,"%m%d")

```

```

attach(table)
sub = subset(table, year > 2016)
sub = subset(sub, monthday == '1231' | monthday == '0630', select=c(Coupon, year, monthday, Asked))
rownames(sub) <- 1:nrow(sub)
detach(table)
sub

```

##	Coupon	year	monthday	Asked
## 1	0.625	2017	0630	100.0469
## 2	0.750	2017	0630	100.0938
## 3	2.500	2017	0630	100.7734
## 4	0.750	2017	1231	99.9297
## 5	1.000	2017	1231	100.1641
## 6	2.750	2017	1231	101.7188
## 7	0.625	2018	0630	99.5000
## 8	1.375	2018	0630	100.5469
## 9	2.375	2018	0630	101.8984
## 10	1.250	2018	1231	100.1641
## 11	1.375	2018	1231	100.3516
## 12	1.500	2018	1231	100.6172
## 13	1.000	2019	0630	99.1797
## 14	1.625	2019	0630	100.6250
## 15	1.125	2019	1231	99.0313
## 16	1.625	2019	1231	100.4375
## 17	1.625	2020	0630	100.0313
## 18	1.875	2020	0630	100.8984
## 19	1.750	2020	1231	100.0156
## 20	2.375	2020	1231	102.3906
## 21	1.125	2021	0630	96.9063
## 22	2.125	2021	0630	101.1250
## 23	2.000	2021	1231	100.3359
## 24	2.125	2021	1231	100.8906
## 25	2.125	2022	0630	100.4219
## 26	2.125	2022	1231	99.9453
## 27	1.375	2023	0630	95.0234
## 28	2.250	2023	1231	99.9141

```

num = c(3,3,3,2,2,2,2,2,1,1)
maturityYear = c(1,1,1,2,2,2,3,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,11,12)
coupon = rep(0,24)
for (i in 1:24){
  coupon[i] <- as.numeric(sub$Coupon[i])
}

c = rep(0,24)
for (i in 1:24){
  c[i] <- as.numeric(sub$Asked[i])
}

```

```

# Liability schedule
b = 1000000*c(9,9,10,10,6,6,9,9,10,10,5,3)
dir = rep("=",12)

dedication(c,coupon,maturityYear,b)

```

```
## [1] "No feasible solution found"
```

```
## [1] "No feasible solution found"
```