Tutorial letter 203/2/2018

APPLIED LINEAR ALGEBRA

APM1513

Semester 2

Department of Mathematical Sciences

IMPORTANT INFORMATION:

This tutorial letter contains solutions to assignment 3

BARCODE

CONTENTS

Page

Assignment 3

QUESTION 2

The octave code to solve the problem is

```
>C=[6000;5000;4000;5000;5500;6000;9000;8500;8000]
  C = 6000
      5000
      4000
      5000
      5500
      6000
      9000
      8500
      8000
>A = [6000 0 0 5000 0 0 9000 0 0;
      0 5000 0 0 5500 0 0 8500 0;
      0 0 4000 0 0 6000 0 0 8000]
  A = 6000 0 0 5000 0 0 9000 0 0
      0 5000 0 0 5500 0 0 8500 0
      0 0 4000 0 0 6000 0 0 8000
>b = [22;21;25]
  b = 22
      21
      25
>lb = []
  lb = [](0x0)
>ub = [17;17;17;31;31;31;26;26;26]
  ub =   17
         17
```

```
         17
         31
         31
         31
         26
         26
         26
>ctype = "UUU"
   ctype = UUU
>vartype = "CCCCCCCCC"
  vartype = CCCCCCCCC
>s = 1
   s = 1
>[xmax,Lmax]=glpk(C,A,b,lb,ub,ctype,vartype,s)
   xmax = 0.0019662
          0.0054809
          0.0078679
          0.0078679
          0.0016577
          0.0046980
          0.0022568
          0.0046981
          0.0010950
          0.0070162
   Lmax = 0.31471
```

Note, we have put $s = 1$ because we want to minimize the cost. From the solutions above, we see that number of trucks needed are $x_1 = 2$,x(5),x(3)=8,x(4)=8,x(5)=2,x(6)=5 $x_9 = 7$ with the cost of R 315

QUESTION 3

The octave code to solve the problem is

```
>C = [-3;-4;2]
  C = -3
      -4
       1
```

```
>A = [-1 1 2;2 1 1]
   A = -1 1 2
        2 1  1
>b = [5;20]
  b = 5
      20
>lb = []
  lb = [](0x0)
>ub = []
  ub = [](0x0)
>ctype = "UU"
   ctype = UU
>vartype = "CCC"
  vartype = CCC
>s = 1
   s = 1
>[xmax,Lmax]=glpk(C,A,b,lb,ub,ctype,vartype,s)
   xmax = 5.0000e+000
          1.0000e+000
          3.1259e-297
   Lmax = -55
```

Note, we have put $s = 1$ because we want to minimize the value of L. The points at which the minimum occurs are $x_1 = 5$, $x_2 = 1$, and $x_3 = 0.003$.

QUESTION 4

The octave code to solve the problem is

```
>C = [2;3;4;3]
  C = 2
      3
      4
      3
>A = [1.5 2 1.5 1;1 2 1 3;5 4 7 2;6 3 7 4;8 4 8 2]
   A = 1.5 2 1.5 1
       1   2 1   3
       5   4 7   2
```

```
       6   3 7   4
       8   4 8   2
>b = [30;45;65;60;70]
  b = 30
      45
      65
      60
      70
>lb = []
  lb = [](0x0)
>ub = []
  ub = [](0x0)
>ctype = "UUUUU"
   ctype = UUUUU
>vartype = "CCCC"
  vartype = CCCC
>s = -1
   s = -1
>[xmax,Lmax]=glpk(C,A,b,lb,ub,ctype,vartype,s)
   xmax = 7.3519e+223
          8.3989e+217
          4.2006e+149
          5.9310e-310
   Lmax = 1.9406e-316
```

Note, we have put $s = -1$ because we want to maximize the value of L.