Problem 3b)

```
Ab = [8      2      6      7      2      3      7
     8      2      3      9      3     10      5
     3      5      8     10      9      4      4
     7     10      3      6      3      2      9
     7      4      6      2      9      3      6];

[Q,R] = qr(Ab)
rank_A = 5;
range_A_basis = Q
[Q_AT, R_AT] = qr(Ab')
null_A_basis = Q_AT(:,rank_A+1:end)
```

Q =

Columns 1 through 3

```
-0.521862458442754  -0.380545247324821  -0.193649306515763
-0.521862458442754  -0.380545247324821   0.262898350739971
-0.195698421916033   0.408120989884590  -0.796722981003681
-0.456629651137410   0.736272326345849   0.465978841883819
-0.456629651137410  -0.041363613839654  -0.203667900567051
```

Columns 4 through 5

```
 0.040645231017152  -0.737355274266145
-0.543972405989053   0.466715510677822
-0.383299558592901   0.115988470109281
-0.005809507187083  -0.179505965645316
 0.745311803694785   0.439099208270851
```

R =

Columns 1 through 3

```
-15.329709716755893   -9.458757059274912  -10.372016361549733
                  0    7.715692768223541    1.800695989152955
                  0                    0   -6.571055512654960
                  0                    0                    0
                  0                    0                    0
```

Columns 4 through 6

```
-13.959820763343661   -9.850153903106975   -9.850153903106977
  2.327392672044557    3.606907126817866   -1.966150444511572
 -4.568152548818599   -7.204184969296739   -0.817902354095818
 -6.988464058443356    1.690054928422847   -4.626670204500490
                  0    4.382707191986418    3.877328857938831
```

Column 7

  -13.894587956038318
    3.444210245715226
   -0.256143142373142
    0.451041610288154
   -1.344913927219521

range_A_basis =

  Columns 1 through 3

  -0.521862458442754 -0.380545247324821 -0.193649306515763
  -0.521862458442754 -0.380545247324821   0.262898350739971
  -0.195698421916033   0.408120989884590 -0.796722981003681
  -0.456629651137410   0.736272326345849   0.465978841883819
  -0.456629651137410 -0.041363613839654 -0.203667900567051

  Columns 4 through 5

   0.040645231017152 -0.737355274266145
  -0.543972405989053   0.466715510677822
  -0.383299558592901   0.115988470109281
  -0.005809507187083 -0.179505965645316
   0.745311803694785   0.439099208270851

Q_AT =

  Columns 1 through 3

  -0.545595471576379 -0.022748948018772   0.476196441497620
  -0.136398867894095 -0.005687237004693 -0.306305252708422
  -0.409196603682284 -0.383888497816780 -0.308636819617246
  -0.477396037629331   0.224645861685375 -0.261239892306536
  -0.136398867894095   0.116588358596207 -0.676537198125930
  -0.204598301841142   0.847398313699263   0.101544958805178
  -0.477396037629331 -0.264456520718226   0.218854093874491

  Columns 4 through 6

  -0.015000040151501 -0.344588559642402 -0.230628358575208
  -0.845991224443723   0.107434881549417   0.276429581772348
   0.419300961997411 -0.030223205808153   0.634363698284307
   0.152461244789753   0.698494091515857 -0.374244995506417
   0.037559363258159 -0.594035356643606 -0.386929361997940
   0.049374660876777 -0.149305037519217   0.418703482742359
  -0.284899203508563 -0.075756409410977 -0.053793034333592

  Column 7

  -0.550353794794153
  -0.289626271335198

```
        -0.103860645834654
        -0.046725100793018
         0.078082527762489
         0.172342091024591
         0.751304450426275


R_AT =

  Columns 1 through 3

 -14.662878298615180 -15.003875468350419 -14.321881128879944
                   0   8.178246812748597   2.459730004529740
                   0                   0  -9.991668991467277
                   0                   0                   0
                   0                   0                   0
                   0                   0                   0
                   0                   0                   0

  Columns 4 through 5

 -14.390080562826991 -12.480496412309666
  -0.355452312793314  -0.031279803525811
  -2.079862081188851  -4.737221966137789
  -8.744907590816009  -1.891473886369035
                   0  -7.015503221932307
                   0                   0
                   0                   0


null_A_basis =

  -0.230628358575208  -0.550353794794153
   0.276429581772348  -0.289626271335198
   0.634363698284307  -0.103860645834654
  -0.374244995506417  -0.046725100793018
  -0.386929361997940   0.078082527762489
   0.418703482742359   0.172342091024591
  -0.053793034333592   0.751304450426275
```

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