Note: These problems are designed for practice during a 50 minute recitation.

1. **Easy** problems: expected to be solved in *5 min*.
2. **Medium** problems: expected to be solved in *30 min*.
3. **Hard** problems: expected to be solved in *15 min*.

During the recitation, you may discuss the problems with your peers and the TA. Please control your volume and don’t annoy others. An electronic copy of these problems and solutions will be posted on the following URL: <http://cs.utsa.edu/~btang/pages/teaching.html>.

**Questions**:

1. (Easy, 2 min) Let . (Textbook [KR] Page 254: 1d & e)
   1. What is the element of A in the (3, 2)th position?   
      ***Answer:*** 1.
   2. What is At?   
      ***Answer:*** The transpose of A is a matrix: .
2. (Easy, 3 min) Find A + B, where (Textbook [KR] Page 254: 2a)  
   ***Answer:*** .
3. (Medium, 5 min)If , find AB.(Textbook [KR] Page 255: 3a)  
   ***Answer:*** .
4. (Medium, 10 min) Find a matrix A such that (Textbook [KR] Page 255: 5. [Hint: Finding A requires that you solve systems of linear equations or solve using matrix inverses. ])  
   ***Answer:*** First we need to observe that must be a matrix; it must have two rows since the matrix it is being multiplied by on the left has two columns, and it must have two columns since the answer obtained has two columns. If we write out what the matrix multiplication means, then we obtain the following system of linear equations:  
   Solving these equations by elimination of variables, we obtain , , , . As a check we compute that, indeed, .
5. (Medium, 15 min) Let A be the matrix: . Show that if , then: . (Textbook [KR] Page 256: 19)  
   ***Answer:*** As we have to do is form the products AA-1 and A-1A, using the purported A-1, and see that both of them are the identity matrix. It is easy to see that the upper left and lower right entries in each case are , and the upper right and lower left entries are all 0.
6. (Hard, 15 min) What is the most efficient way to multiply the matrices , , and with sizes ? (Textbook [KR] Page 256: 24b)  
   ***Answer:*** If we compute the product as , then it will take multiplications for the first product and then for the second. This is a total of 300 multiplications. If we compute the product as , then it will take multiplications for the first product and then for the second. This is a total of 3000 multiplications. Therefor the first method is more efficient.