Name: LessTanker

Problem 0-1.

(a) $A = \{1, 6, 12, 13, 9\}, B = \{3, 6, 12, 15\}$ As a result, $A \cap B = \{6, 12\}$

(b) Also easy to find that $A \cup B = \{3, 6, 9, 12, 13, 15\}$,so answer is 7.

(c) $|A - B| = \{1, 9, 13\}$ Answer is 3.

Problem 0-2.

(a) $E[X] = \frac{3}{2}$

(b) $E[Y] = 12.25$

(c) $E[X + Y] = 13.75$

Problem 0-3.

(a) True

(b) False

(c) False

Problem 0-4. Assume that for k, the cite is true.Then for the k+1 case:

$$\sum_{i=1}^{k+1} i^3 = \sum_{i=1}^{k} i^3 + (k+1)^3 = [\frac{k(k+1)}{2}]^2 + (k+1)^3 = [\frac{(k+1)(k+2)}{2}]^2$$

Therefore we prove that cite.

Problem 0-5. Assume that we have a graph with e_0 edges and v_0 vertices while $e_0 = v_0 - 1$. Then we add a vertice to that graph, we can find that we must add two more edges to make this new graph acyclic. As a result, the original graph must be acyclic.

Problem 0-6. Submit your implementation to alg.mit.edu.

```
def count_long_subarray(A):
    '''
    Input:  A     | Python Tuple of positive integers
    Output: count | number of longest increasing subarrays of A
    '''
    count = 1
    ####################
    # YOUR CODE HERE #
    ####################
    max_len = 1
    cur_count = 1
    for i in range(1,len(A)-1):
        if A[i] > A[i-1] :
            cur_count += 1
        else:
            cur_count = 1

        if cur_count > max_len :
            max_len = cur_count
            count = 1
        elif cur_count == max_len:
            count += 1
    return count
```