Midterm Exam

Name: **St #:** **Section:**

1. Solve the following time complexity problems.

a) Show that: $3x^3 + x^2 logx + 2x^2 + 3logx \in O(x^3)$

b) Show that: $2x^2 + (logx)^2 + logx + 8 \in \theta(x^2)$ (Average time complexity)

2. Write a pseudo code for finding two smallest numbers in a list of positive integers. Trace your code for a small list with at least 4 integers.

3. Find the worst-case time complexity (big-O) for the following codes:

a)

```
for i=1 to n-1
    for j=2i+1 to 2n-1
        comparison operation
```

b)

```
for i=1 to n-1
    for j=1 to m+1
            for k=1 to t
                comp operation
for l=1 to n
        multiplication operation
```

4. Write a pseudocode for the following:

a) An algorithm that takes n integers and defines if number of negative integers is larger than positive integers in the list.

b) A recursive code for exponentiation: a^b

5. Find GCD(323,124). Also, find "s" and "t" s. t. GSD(323,124)=s*323+t*124