Problem 1 Analysis Midterm

Linear Search

```
For (int i = 0; i < n; i++)
  { IF (val == a[i])
      return i;
  }
```

$O_b O_i$ $P O_s$

$O_b + \sum_{i=0}^{n-1}$

$O_b + nO_i S$

$C'n + C$

$O(n)$

$\sum_{i=x}^{y} (y - x) + 1$

$(n-1) - (0) + 1$

$n - 1 + 1$

n

Binary Search Written Analysis

```
int binsrch( int b[], int n, int num)
  {
      int lownum =0;
      int highnum =n;

do {
      int mid = ((lownum + highnum )/2);
if (val = b[mid] ) return mid;
else if ( val > b[mid ]) lownum = mid;
else highnum =(mid -1);
   }
while
      low
```

Binary Search

lowNum = 0

highNum = n-1

$$\frac{lowNum + highNum}{2} = 1$$

$$N = 2^x$$

$$\log_2 N = \log_2 (2^x)$$

$$\log_2 N = \log_2 (2) \times x$$

$$x - 1 = \log_2 N$$

$$\boxed{\log_2 N}$$