## 1:

$$T(N) = T(N-1) + N * constant$$

$$= T(N-2) + (N-1) * constant + N * constant = T(N-2) + 2 * N * constant - constant$$

$$= T(N-3) + 3 * N * constant - 2 * constant - constant$$

If we keep going:

= 
$$T(N-k) + k * N * constant - (k-1) * constant - ... - 2*constant - constant$$
  
=  $T(N-k) + k * N * constant - constant * (k*(k-1))/2$ 

If we say k = N

$$T(N)$$
 =  $T(0) + N * N * constant - constant * (N * (N-1)/2)$   
=  $N^2 - N^*(N-1)/2$   
=  $N^2/2 + N/2$ 

Therefore, the worst-case complexity is O(N<sup>2</sup>)

## 2:

```
[16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1]
[15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,16]
 [14,13,12,11,10,9,8,7,6,5,4,3,2,1,15,16]
[<u>13</u>,12,11,10,9,8,7,6,5,4,3,2,1,14,15,16]
 [12,11,10,9,8,7,6,5,4,3,2,1,13,14,15,16]
[11,10,9,8,7,6,5,4,3,2,1,12,13,14,15,16]
[10,9,8,7,6,5,4,3,2,1,11,12,13,14,15,16]
[9,8,7,6,5,4,3,2,1,10,11,12,13,14,15,16]
[8,7,6,5,4,3,2,1,9,10,11,12,13,14,15,16]
[<u>7</u>,6,5,4,3,2,1,8,9,10,11,12,13,14,15,16]
[6,5,4,3,2,1,7,8,9,10,11,12,13,14,15,16]
[5,4,3,2,1,6,7,8,9,10,11,12,13,14,15,16]
[3,2,1,4,5,6,7,8,9,10,11,12,13,14,15,16]
[\underline{2},1,3,4,5,6,7,8,9,10,11,12,13,14,15,16]
[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16]
```

## 4:

Yes, the quadratic interpolation function was very similar and in some runs the same to the actual plotted data.