Analysis of the Bubble Sort Algorithm

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for (int i= 0; i < n-1; i ++)
    for (int j = 0; j < n-1; j ++)
     if (x[j] > x[j+1])
         // Swap x[j] with x[j+1];
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- t1 = time to set up a for loop
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- t3 = time to compare two elements
- t4 = time to to switch them.
- p = probability two items need to be switched

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Overall time = t1 + (n-1) (t2 + t1 + (n-1) (t2 + t3 + pt4))
= (t2 + t3 + pt4) * n^2 + (t1 - t2 - 2t3 - 2pt4) * n + (t3 + pt4)

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$= (t2 + t3 + pt4) * n^2 + (t1 - t2 - 2t3 - 2pt4) * n + (t3 + pt4)$

This has the form: $c1 * n^2 + c2 * n + c3$

where $c1 = t2 + t3 + pt4$; $c2 = t1 - t2 - 2t3 - 2pt4$; $c3 = t3 + pt4$