1. 1) 直接插入排序：

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 初始时 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第1趟 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第2趟 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第2趟 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第3趟 | 5 | 21 | 89 | 114 | 711 | 90 | 212 | 16 | 50 |
| 第4趟 | 5 | 21 | 89 | 90 | 114 | 711 | 212 | 16 | 50 |
| 第5趟 | 5 | 21 | 89 | 90 | 114 | 212 | 711 | 16 | 50 |
| 第6趟 | 5 | 16 | 21 | 89 | 90 | 114 | 212 | 711 | 50 |
| 第7趟 | 5 | 16 | 21 | 50 | 89 | 90 | 114 | 212 | 711 |

1. 增量序列为{1,3,5}的希尔排序：

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 初始时 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 5-排序 | 89 | 21 | 16 | 50 | 5 | 90 | 212 | 114 | 711 |
| 3-排序 | 50 | 5 | 16 | 89 | 21 | 90 | 212 | 114 | 711 |
| 1-排序 | 5 | 16 | 21 | 50 | 89 | 90 | 114 | 212 | 711 |

1. 归并排序：

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 初始时 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第一次递归 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第二次递归 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 21,89归并 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 114,711归并 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 21,89,114,711归并 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第二段递归 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 5,90归并 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 212,16,50拆分 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 16,50归并 | 21 | 89 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 212,16,50归并 | 21 | 89 | 114 | 711 | 5 | 90 | 16 | 50 | 212 |
| 5,90,16,50，212归并 | 21 | 89 | 114 | 711 | 5 | 16 | 50 | 90 | 212 |
| 全部归并 | 5 | 16 | 21 | 50 | 89 | 90 | 114 | 212 | 711 |

1. 快速排序：

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 初始时 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第1趟划分 | 50 | 21 | 16 | 5 | 89 | 90 | 212 | 711 | 114 |
| 第2趟划分 | 5 | 21 | 16 | 50 | 89 | 90 | 212 | 711 | 114 |
| 第3趟划分 | 5 | 21 | 16 | 50 | 89 | 90 | 212 | 711 | 114 |
| 第4趟划分 | 5 | 16 | 21 | 50 | 89 | 90 | 212 | 711 | 114 |
| 第5趟划分 | 5 | 16 | 21 | 50 | 89 | 90 | 212 | 711 | 114 |
| 第6趟划分 | 5 | 16 | 21 | 50 | 89 | 90 | 114 | 212 | 711 |

1. 堆排序：

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 初始时 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 建堆 | 711 | 89 | 212 | 50 | 5 | 90 | 114 | 16 | 21 |
| deQueue | 212 | 89 | 114 | 50 | 5 | 90 | 21 | 16 | 711 |
| deQueue | 114 | 89 | 90 | 50 | 5 | 16 | 21 | 212 | 711 |
| deQueue | 90 | 89 | 21 | 50 | 5 | 16 | 114 | 212 | 711 |
| deQueue | 89 | 50 | 21 | 16 | 5 | 90 | 114 | 212 | 711 |
| deQueue | 50 | 5 | 21 | 16 | 89 | 90 | 114 | 212 | 711 |
| deQueue | 21 | 5 | 16 | 50 | 89 | 90 | 114 | 212 | 711 |
| deQueue | 16 | 5 | 21 | 50 | 89 | 90 | 114 | 212 | 711 |
| deQueue | 5 | 16 | 21 | 50 | 89 | 90 | 114 | 212 | 711 |

1. 冒泡排序：

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 初始时 | 89 | 21 | 114 | 711 | 5 | 90 | 212 | 16 | 50 |
| 第1遍起泡 | 21 | 89 | 114 | 5 | 90 | 212 | 16 | 50 | 711 |
| 第2遍起泡 | 21 | 89 | 5 | 90 | 144 | 16 | 50 | 212 | 711 |
| 第3遍起泡 | 21 | 5 | 89 | 90 | 16 | 50 | 144 | 212 | 711 |
| 第4遍起泡 | 5 | 21 | 89 | 16 | 50 | 90 | 144 | 212 | 711 |
| 第5遍起泡 | 5 | 21 | 16 | 50 | 89 | 90 | 144 | 212 | 711 |
| 第6遍起泡 | 5 | 16 | 21 | 50 | 89 | 90 | 144 | 212 | 711 |
| 第7遍起泡 | 5 | 16 | 21 | 50 | 89 | 90 | 144 | 212 | 711 |

1. 1) 直接插入排序：n次比较，所以是O(N)
2. 增量序列为{1,3,5}的希尔排序：O(N)+O(N)+O(N)=O(N)
3. 归并排序：和初始次序无关，所以是O(NlogN)
4. 快速排序：

所以是O(N2)

1. 堆排序：每次deQueue都为logN，所以是O(NlogN)
2. 冒泡排序：冒一次泡，所以是O(N)
3. 1) 直接插入排序：

,所以是O(N2)

1. 希尔排序：O(N2)+O(N2)+O(N2)=O(N2)
2. 归并排序：和初始次序无关，所以是O(NlogN)
3. 快速排序：

,所以是O(N2)

1. 堆排序：每次deQueue都为logN，所以是O(NlogN)
2. 冒泡排序：

所以是O(NlogN)