CS 241 Report

Option 1:

5 sets of 100 random positive integers chosen:

997 961 952 945 940 938 935 927 916 915 905 892 872 870 846 832 817 790 786 781 776 769 758 757 756 754 752 743 736 715 696 687 675 661 660 656 642 636 631 630 626 618 612 601 598 582 581 565 564 559 553 546 545 540 531 507 504 493 492 482 440 436 434 417 414 409 399 397 394 393 354 353 317 313 311 278 253 209 179 177 175 148 147 124 121 117 115 104 84 78 70 58 51 44 39 38 29 22 8 5

---

982 979 969 967 935 902 880 876 871 868 837 835 831 820 798 783 776 773 755 753 720 719 708 706 690 682 658 644 630 626 609 603 601 598 587 577 567 562 561 555 553 535 531 530 528 520 519 518 510 505 497 489 477 468 452 444 435 421 410 401 394 388 382 379 378 356 352 347 339 335 321 316 301 296 282 258 253 246 245 218 212 210 206 202 191 190 188 184 179 163 155 154 143 116 107 89 74 46 10 7

---

992 985 967 943 934 920 910 908 905 897 896 892 884 879 863 856 849 837 833 823 810 801 757 756 743 741 737 720 718 709 699 695 669 635 629 628 613 593 586 564 562 559 545 497 491 482 478 467 465 461 448 409 408 406 382 376 342 328 310 306 300 285 263 249 244 242 235 233 224 223 218 215 212 208 197 189 180 177 155 138 126 124 97 95 86 85 79 70 69 62 49 44 43 40 38 23 21 16 13 12

---

999 995 983 976 953 950 935 930 928 927 920 914 913 911 903 897 879 873 865 857 856 828 820 817 801 795 793 779 765 762 754 732 728 725 723 722 711 701 676 668 660 657 645 644 639 634 631 625 621 587 575 567 564 557 545 498 492 463 416 405 399 393 387 367 337 325 310 297 284 277 275 266 264 247 238 224 218 215 204 191 185 182 179 162 161 136 128 121 109 96 94 83 81 71 63 52 21 13 3 2

---

993 979 970 966 929 925 918 908 904 891 876 866 862 842 840 839 836 832 826 819 802 785 749 745 735 727 714 706 705 699 681 680 675 661 660 643 641 630 605 586 583 580 570 556 555 553 549 536 528 526 513 506 496 487 483 481 472 466 455 430 406 403 401 387 376 365 363 361 344 341 340 338 329 318 308 300 260 251 234 226 223 219 213 196 193 191 176 161 150 140 135 134 133 118 117 113 111 100 89 85

ReHeap Counters: 70
Sequential Counter: 100
ReHeap Counters: 70
Sequential Counter: 107
ReHeap Counters: 76
Sequential Counter: 134
ReHeap Counters: 82
Sequential Counter: 109
ReHeap Counters: 88
Sequential Counter: 101

<u>Averages:</u>

ReHeap Average: 77.2
Sequential Average: 110.2

Ultimately the values and swap returns look pretty healthy. The Sequential route should take slightly longer since building the heap and adding the value will take **O(n*log(n))** which in the case of 100 random generations should never take more than 200 swaps. The reheap algorithm and heapsort generally takes about **O(n)** so

in the same case of 100 random generated values in an array. It should not exceed 100 swaps. My values seem to add up nicely with them and follow the theoretical limits.

The method add(T newEntry) usually takes O(log(n)) time but when using add and building the heap along it. We multiply by an extra n to compensate for the build process and the add process.

Option 2:
User input, positive integers only, no duplicates
Enter numbers followed by whitespaces:

Input: 1 2 3 4 5 6
Output: 6 5 3 4 2 1

ReHeap Counter: 4
Sequential Counter: 8