**(1)** Create vectors

**(a)** **c(2:30)**

[1] 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

[27] 28 29 30

**(b)**  **c(30:2)**

[1] 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5

[27] 4 3 2

**(c) c(1:30,29,1)**

[1] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

[27] 27 28 29 30 29 1

**(d)**#assigning name dev to (4,6,3)

**dev<-c(4,6,3)**

> dev

[1] 4 6 3

**(e)** **rep(5:7,10)**

[1] 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7

>

**(f) rep(5:7,times=c(11,10,10))**

[1] 5 5 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7

>

**(g)** **rep(c(4,6,3),times=c(10,20,30))**

[1] 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3

[40] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3

**(2)** Create a vector of the values of *eX* sin(*x*) at *x* = 3*,* 3.1*,* 3.2*, ,* 6.

**Answer**

**x<-seq(3,6,by=0.1)**

**exp(x)\*sin(x)**

[1] 2.8344711 0.9230055 -1.4320654 -4.2769020 -7.6570591

[6] -11.6163451 -16.1954669 -21.4304437 -27.3507725 -33.9773327

[11] -41.3200162 -49.3750762 -58.1221905 -67.5212405 -77.5088155

[16] -87.9944570 -98.8566695 -109.9387348 -121.0443775 -131.9333449

[21] -142.3169809 -151.8538900 -160.1458060 -166.7338044 -171.0950158

[26] -172.6400256 -170.7111690 -164.5819569 -153.4578954 -136.4789910

[31] -112.7242573

**(3)**Execute the following lines which create two vectors of random integers which are chosen with replacement from the integers 0, 1, : : : , 999. Both vectors have length 250.

set.seed(100)

x <- Sample (0:999, 250, replace=T)

y <- Sample (0:999, 250, replace=T)

* **(a)** Identify out the values in y which are > 500

**Answer y[y>500]**

[1] 956 843 847 617 791 905 794 754 911 911 955 671 744 675 731 675 562

[18] 679 745 950 637 649 662 759 553 539 849 653 950 617 976 655 598 947

[35] 878 617 604 785 555 768 510 523 992 996 786 515 502 911 538 580 801

[52] 638 736 579 613 958 751 639 897 984 722 549 682 732 962 760 581 703

[69] 829 527 573 970 650 942 564 511 718 511 803 520 696 847 845 639 928

[86] 963 707 630 773 892 511 749 926 994 890 972 810 953 852 646 510 797

[103] 565 659 518 737 779 612 910 634 670 906 730 919 854 801 995 753 603

[120] 593 582 995 950 633 996 579 994

* **b)**Identify the index positions in y of the values which are > 700?

**Answer (1:length(y)) [y>700]**

[1] 2 5 6 10 12 14 15 16 19 20 22 26 37 38 48 51 53

[18] 56 60 62 68 70 74 76 77 80 89 91 98 100 107 109 113 119

[35] 120 121 130 135 139 143 149 155 158 159 164 166 168 170 171 173 174

[52] 178 181 186 187 188 190 196 203 204 207 212 213 214 216 225 226 227

[69] 233 238 241 249

**c)** What are the values in x which are in Same index position to the values in y which are > 400?

**Answer x[y>400]**

[1] 257 468 483 546 170 882 398 762 669 359 690 535 710 538 420 171 770

[18] 549 695 889 180 629 865 827 780 884 207 307 330 198 235 274 591 253

[35] 123 229 597 211 647 960 676 445 357 455 445 245 694 412 327 572 966

[52] 661 624 856 774 834 91 982 733 300 733 906 209 358 906 517 125 30

[69] 771 41 971 11 80 965 37 200 840 396 392 472 101 237 579 16 42

[86] 463 629 143 122 728 19 505 169 606 815 843 788 19 568 161 162 709

[103] 761 857 437 417 585 824 326 653 288 348 123 108 838 202 963 660 298

[120] 119 120 956 913 823 877 800 611 344 751 218 292 631 269 658 76 71

[137] 370 297 369 845 299 701 946 219 712 61

* **d)**  How many values in y are within 200 of the maximum value of the terms in y?

**Answer**  **sum(y>max(y)-200)**

[1] 48

* **e)**  How many numbers in x are divisible by 2?
* Answer **sum(x%%2==0)**
* [1] 119
* **f)**  Sort the numbers in the vector x in the order of increasing values in y.
* **Answer:**
* **x[order(y)]**
* [1] 26 41 348 327 535 238 458 399 381 892 992 491 620 357 793 279 836
* [18] 319 748 717 370 330 995 950 815 89 674 989 361 185 389 389 881 599
* [35] 684 280 497 957 28 248 928 606 701 551 43 788 37 806 744 448 277
* [52] 459 860 369 551 772 72 926 951 568 480 199 916 307 603 437 812 204
* [69] 130 777 706 87 673 660 624 488 600 421 599 570 583 716 138 36 457
* [86] 463 923 279 56 664 577 954 908 355 352 726 439 552 957 698 472 297
* [103] 919 738 412 237 661 169 209 538 960 369 445 472 906 30 770 123 202
* [120] 591 299 676 326 834 327 660 728 505 417 774 956 815 572 16 982 307
* [137] 965 207 245 695 122 119 42 358 712 733 392 297 370 597 71 455 877
* [154] 517 546 274 357 761 946 611 865 733 41 568 963 827 629 198 229 120
* [171] 780 344 535 420 549 889 37 843 101 709 19 80 218 171 200 906 913
* [188] 710 180 585 771 76 762 884 396 694 857 823 445 856 170 398 298 300
* [205] 269 606 123 579 468 19 483 788 330 838 631 647 288 437 971 882 751
* [222] 800 669 359 91 292 824 161 143 211 629 235 701 108 690 257 125 840
* [239] 162 463 348 253 11 966 653 61 658 845 624 219
* g)  Create the vector (x1 +2x2 -x3;x2 +2x3 -x4 ,, xn−2 +2xn−1 -xn).
* **Answer**
* **x[-c(249,250)]+2\*x[-c(1,250)]-x[-c(1,2)]**
* [1] 269 1305 196 509 622 1737 1006 1292 262 536 2108 1044 314
* [14] 1253 1896 720 559 385 1204 1050 1417 1038 1614 1417 -8 830
* [27] 1983 1702 615 325 1996 670 1561 1455 2293 620 449 2477 919
* [40] -75 1283 1592 1828 1542 805 1167 2341 991 491 769 491 394
* [53] 192 1203 974 270 -16 1212 556 490 797 1891 1867 1209 704
* [66] 822 1100 241 1221 1191 494 505 1843 1664 1053 1562 1570 2351
* [79] 557 410 738 1455 2846 479 458 1795 929 115 860 2336 966
* [92] 477 348 1871 1167 1298 737 -586 1245 1036 1064 110 193 817
* [105] 967 1925 2362 188 245 1401 2368 728 -409 2131 123 1143 2168
* [118] 286 1484 1240 708 753 1286 1259 -587 1061 2358 1958 516 -285
* [131] 1219 1839 1153 1639 139 918 93 339 1048 1888 704 -535 1837
* [144] 424 628 2585 1017 -118 -88 283 2219 1033 -130 566 1393 1713
* [157] 2400 128 600 1760 1471 1367 713 177 387 -495 683 1374 2038
* [170] 1314 686 763 1440 2084 488 1587 1805 963 1382 465 799 1889
* [183] 2086 696 758 486 42 -136 981 2385 1664 -122 1468 1985 1137
* [196] -63 1197 51 1327 570 1368 1959 2240 584 1273 1866 1950 334
* [209] 570 358 1628 895 447 371 725 1671 1923 1622 -39 733 846
* [222] 688 2233 831 1509 739 -152 514 413 1030 444 1439 1686 1119
* [235] 616 360 837 1821 2271 494 987 1338 1797 552 1043 1991 681
* [248] -116

h)  Calculate: refer to question in assignment.

* **Answer**

**> sum(exp(-x[-10])/(x[-length(x)]+10))**

**[1] 2.379427e-08**