1. Create the vectors
2. (2, 3, … , 29, 30)

> a=2:30

> a

[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 28

[28] 29 30

(b) (30, 29, … , 2)

|  |
| --- |
| > b<-30:2  > b  [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 4  [28] 3 2 |
|  |
| |  | | --- | |  | |

(c) (1, 2, 3, …. , 29, 30, 29, 28, , 2, 1)

|  |
| --- |
| > c<-c(1:30,29:1)  > c  [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  [28] 28 29 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  [55] 5 4 3 2 1 |
|  |
| |  | | --- | |  | |

(d) (4, 6, 3) and assign it to the name dev.

|  |
| --- |
| > dev<-c(4,6,3)  > dev  [1] 4 6 3 |
|  |
|  |

For parts (e), (f) and (g) .

(e) (5, 6, 7, 5, 6, 7, , 5, 6, 7) where there are 10 occurrences of 5.

|  |
| --- |
| > e<-NULL  > for(i in 1:10)  + {  + e<-c(5,6,7,e)  + }  > e  [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) (5, 6, 7, 5, 6, 7, , 5, 6, 7, 5) where there are 11 occurrences of 5, 10 occurrences of 6 and 10 occurrences of 7.

|  |
| --- |
| > e<-NULL  > for(i in 1:10)  + {  + e<-c(5,6,7,e)  + }  > e<-c(e,5)  > e  [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 5 |
|  |
|  |

(g) (4, 4, , 4, 6, 6, , 6, 3, 3, , 3) where there are 10 occurrences of 4, 20 occurrences of 6 and 30 occurrences of 3.

> k<-NULL

> for(i in 1:10)

+ {

+ k<-c(4,k)

+ }

> l<-NULL

> for(i in 1:20)

+ {

+ l<-c(6,l)

+ }

> m<-NULL

> for(i in 1:30)

+ {

+ m<-c(3,m)

+ }

> g<-c(k,l,m)

> g

[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 3

[41] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3

1. Create a vector of the values of eX sin(x) at x = 3, 3.1, 3.2, , 6.
2. > x<-seq(3,6,.1)
3. > y<-NULL
4. > for(i in x)
5. + {
6. + y<-c(exp(i)\*sin(i),y)
7. + }
8. > y
9. [1] -112.7242573 -136.4789910 -153.4578954 -164.5819569 -170.7111690 -172.6400256
10. [7] -171.0950158 -166.7338044 -160.1458060 -151.8538900 -142.3169809 -131.9333449
11. [13] -121.0443775 -109.9387348 -98.8566695 -87.9944570 -77.5088155 -67.5212405
12. [19] -58.1221905 -49.3750762 -41.3200162 -33.9773327 -27.3507725 -21.4304437
13. [25] -16.1954669 -11.6163451 -7.6570591 -4.2769020 -1.4320654 0.9230055
14. [31] 2.8344711

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)

> set.seed(100)

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

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

> x

[1] 307 257 552 56 468 483 812 370 546 170 624 882 280 398 762 669 204 357 359 690

[21] 535 710 538 748 420 171 770 881 549 277 488 928 348 954 695 889 180 629 989 130

[41] 330 865 777 827 603 491 780 884 207 307 330 198 235 274 591 253 123 229 597 211

[61] 463 647 960 676 445 357 455 445 245 694 412 327 572 966 661 624 856 774 834 91

[81] 459 599 919 982 37 577 733 248 300 733 906 209 358 448 906 389 517 125 30 771

[101] 327 389 41 361 570 684 971 701 11 535 836 806 80 238 965 37 916 726 200 840

[121] 396 392 472 583 352 28 995 957 551 101 237 860 738 497 579 16 472 42 463 629

[141] 673 87 143 908 122 728 950 43 19 199 505 926 138 169 606 815 843 788 19 698

[161] 815 568 480 161 89 162 26 709 761 857 437 417 585 824 793 326 957 653 458 606

[181] 288 717 923 674 185 348 123 108 297 838 992 437 202 963 660 298 119 599 120 788

[201] 369 956 913 823 319 877 800 611 72 421 344 751 218 292 355 631 892 744 457 36

[221] 568 439 600 951 269 658 76 71 370 297 551 369 845 620 399 299 381 701 946 772

[241] 219 716 664 706 279 712 660 41 61 279

> y

[1] 301 956 389 371 843 847 319 132 617 791 338 905 197 794 754 911 322 86 911 955

[21] 671 744 440 115 675 731 483 171 675 262 341 210 16 376 562 679 745 950 163 324

[41] 132 637 330 649 302 71 662 759 553 539 849 653 950 617 492 976 490 655 598 947

[61] 368 878 454 496 460 617 604 785 555 768 404 510 523 992 429 996 786 515 502 911

[81] 264 173 400 538 244 375 580 208 801 638 736 438 579 256 463 168 613 958 478 751

[101] 20 170 639 164 354 186 897 237 984 21 107 244 722 32 549 682 300 388 732 962

[121] 760 581 462 356 383 205 138 389 266 703 407 265 400 197 829 527 395 573 970 650

[141] 333 331 942 381 564 511 138 239 718 297 511 277 360 437 803 520 696 847 845 391

[161] 153 639 287 928 155 963 1 707 630 773 892 511 749 926 91 496 197 994 36 217

[181] 890 118 369 162 166 972 810 953 399 852 64 302 490 646 510 797 565 353 659 239

[201] 265 518 737 779 114 612 910 634 274 352 670 906 730 919 382 854 54 253 367 360

[221] 280 388 348 278 801 995 753 603 593 582 238 454 995 82 51 493 53 950 633 269

[241] 996 358 371 330 104 579 333 3 994 369

1. Identify out the values in y which are > 500.

> t<-NULL

> for(j in y)

+ {

+ if(j>500)

+ {

+ t<-c(j,t)

+ }

+ }

> t

[1] 994 579 996 633 950 995 582 593 603 753 995 801 854 919 730 906 670 634 910 612

[21] 779 737 518 659 565 797 510 646 852 953 810 972 890 994 926 749 511 892 773 630

[41] 707 963 928 639 845 847 696 520 803 511 718 511 564 942 650 970 573 527 829 703

[61] 581 760 962 732 682 549 722 984 897 639 751 958 613 579 736 638 801 580 538 911

[81] 502 515 786 996 992 523 510 768 555 785 604 617 878 947 598 655 976 617 950 653

[101] 849 539 553 759 662 649 637 950 745 679 562 675 731 675 744 671 955 911 911 754

[121] 794 905 791 617 847 843 956

1. Identify the index positions in y of the values which are > 700?

> t<-NULL

> for(j in y)

+ {

+ if(j>700)

+ {

+ t<-c(j,t)

+ }

+ }

> h<-NULL

> h<-which(y %in% t)

> h

[1] 2 5 6 10 12 14 15 16 19 20 22 26 37 38 48 51 53 56 60 62

[21] 68 70 74 76 77 80 89 91 98 100 107 109 113 119 120 121 130 135 139 143

[41] 149 155 158 159 164 166 168 170 171 173 174 178 181 186 187 188 190 196 203 204

[61] 207 212 213 214 216 225 226 227 233 238 241 249

1. What are the values in x which are in Same index position to the values in y which are > 400?

> t<-NULL

> for(j in y)

+ {

+ if(j>400)

+ {

+ t<-c(j,t)

+ }

+ }

> h<-NULL

> h<-which(y %in% t)

> r<-NULL

> for(i in h)

+ {

+ r<-c(x[i],r)

+ }

> r

[1] 61 712 219 946 701 299 845 369 297 370 71 76 658 269 631 292 218 751 344 611

[21] 800 877 823 913 956 120 119 298 660 963 202 838 108 123 348 288 653 326 824 585

[41] 417 437 857 761 709 162 161 568 19 788 843 815 606 169 505 19 728 122 143 629

[61] 463 42 16 579 237 101 472 392 396 840 200 37 965 80 11 971 41 771 30 125

[81] 517 906 358 209 906 733 300 733 982 91 834 774 856 624 661 966 572 327 412 694

[101] 245 445 455 357 445 676 960 647 211 597 229 123 253 591 274 235 198 330 307 207

[121] 884 780 827 865 629 180 889 695 549 770 171 420 538 710 535 690 359 669 762 398

[141] 882 170 546 483 468 257

1. How many values in y are within 200 of the maximum value of the terms in y?

|  |
| --- |
| > s<-NULL  > s<-sort(y,decreasing = T)  > s  [1] 996 996 995 995 994 994 992 984 976 972 970 963 962 958 956 955 953 950 950 950  [21] 947 942 928 926 919 911 911 911 910 906 905 897 892 890 878 854 852 849 847 847  [41] 845 843 829 810 803 801 801 797 794 791 786 785 779 773 768 760 759 754 753 751  [61] 749 745 744 737 736 732 731 730 722 718 707 703 696 682 679 675 675 671 670 662  [81] 659 655 653 650 649 646 639 639 638 637 634 633 630 617 617 617 613 612 604 603  [101] 598 593 582 581 580 579 579 573 565 564 562 555 553 549 539 538 527 523 520 518  [121] 515 511 511 511 510 510 502 496 496 493 492 490 490 483 478 463 462 460 454 454  [141] 440 438 437 429 407 404 400 400 399 395 391 389 389 388 388 383 382 381 376 375  [161] 371 371 369 369 368 367 360 360 358 356 354 353 352 348 341 338 333 333 331 330  [181] 330 324 322 319 302 302 301 300 297 287 280 278 277 274 269 266 265 265 264 262  [201] 256 253 244 244 239 239 238 237 217 210 208 205 197 197 197 186 173 171 170 168  [221] 166 164 163 162 155 153 138 138 132 132 118 115 114 107 104 91 86 82 71 64  [241] 54 53 51 36 32 21 20 16 3 1  > w<-NULL  >  > for(i in 1:200)  + {  +  + w<-c(s[i],w)  +  + }  > w  [1] 262 264 265 265 266 269 274 277 278 280 287 297 300 301 302 302 319 322 324 330  [21] 330 331 333 333 338 341 348 352 353 354 356 358 360 360 367 368 369 369 371 371  [41] 375 376 381 382 383 388 388 389 389 391 395 399 400 400 404 407 429 437 438 440  [61] 454 454 460 462 463 478 483 490 490 492 493 496 496 502 510 510 511 511 511 515  [81] 518 520 523 527 538 539 549 553 555 562 564 565 573 579 579 580 581 582 593 598  [101] 603 604 612 613 617 617 617 630 633 634 637 638 639 639 646 649 650 653 655 659  [121] 662 670 671 675 675 679 682 696 703 707 718 722 730 731 732 736 737 744 745 749  [141] 751 753 754 759 760 768 773 779 785 786 791 794 797 801 801 803 810 829 843 845  [161] 847 847 849 852 854 878 890 892 897 905 906 910 911 911 911 919 926 928 942 947  [181] 950 950 950 953 955 956 958 962 963 970 972 976 984 992 994 994 995 995 996 996 |
|  |
| |  | | --- | | 1. How many numbers in x are divisible by 2?   > counteven<-0  > for(i in 1:250)  + {  + if(x[i]%%2 == 0)  + {  + counteven = counteven + 1  + }  + }  > counteven  [1] 119  Below questions are confusing  (f) Sort the numbers in the vector x in the order of increasing values in y.  (g) Create the vector (x1 + 2x2 - x3; x2 + 2x3 -x4 ,, xn−2 + 2xn−1 - xn).  (h) Calculate: | |

4**.** Use the function paste to create the following character vectors of length 30:

(a) ("Label 1", "Label 2", ....., "Label 30").

\*Note that there is a single space between label and the number following.

|  |
| --- |
| > paste("Label",1:30, sep=" ")  [1] "Label 1" "Label 2" "Label 3" "Label 4" "Label 5" "Label 6" "Label 7"  [8] "Label 8" "Label 9" "Label 10" "Label 11" "Label 12" "Label 13" "Label 14"  [15] "Label 15" "Label 16" "Label 17" "Label 18" "Label 19" "Label 20" "Label 21"  [22] "Label 22" "Label 23" "Label 24" "Label 25" "Label 26" "Label 27" "Label 28"  [29] "Label 29" "Label 30"  (b) ("FN1", "FN2", ..., "FN30").  \*\*In this case, there is no space between fn and the number following.  > paste("FN",1:30, sep="")  [1] "FN1" "FN2" "FN3" "FN4" "FN5" "FN6" "FN7" "FN8" "FN9" "FN10" "FN11"  [12] "FN12" "FN13" "FN14" "FN15" "FN16" "FN17" "FN18" "FN19" "FN20" "FN21" "FN22"  [23] "FN23" "FN24" "FN25" "FN26" "FN27" "FN28" "FN29" "FN30"  5**.** Compound interest can be computed using the formula  A = P × (1 + R/100)n, where P is the original money lent, A is what it amounts to in n years at R percent per year interest.  Write R code to calculate the amount of money owed after n years, where n changes from 1 to 15 in yearly increments, if the money lent originally is 10000 Rupees and the interest rate remains constant throughout the period at 11.5%.  > P=10000  > R=11.5  > A<-NULL  > for(k in 1:15)  + {  + A<-c(P\*(1+R/100)^k,A)  + }  > sort(A,decreasing = F)  [1] 11150.00 12432.25 13861.96 15456.08 17233.53 19215.39 21425.16 23889.05 26636.29  [10] 29699.47 33114.91 36923.12 41169.28 45903.75 51182.68 |
|  |
|  |

6) Generate the following matrices.

[,1] [,2] [,3] [,4]

[1,] 1 101 201 301

[2,] 2 102 202 302

[3,] 3 103 203 303

[4,] 4 104 204 304

[5,] 5 105 205 305

> z=c(1,101,201,301,2,102,202,302,3,103,203,303,4,104,204,304,5,105,205,305)

> z

[1] 1 101 201 301 2 102 202 302 3 103 203 303 4 104 204 304 5 105 205 305

> matrix(z,nrow = 5,ncol = 4, byrow = T)

[,1] [,2] [,3] [,4]

[1,] 1 101 201 301

[2,] 2 102 202 302

[3,] 3 103 203 303

[4,] 4 104 204 304

[5,] 5 105 205 305