Homework 1

Jia-Ru Chung

September 19, 2017

**Note:**  
All answers have to be obtained using R code!

#### Max points = 70

### Question 1 {10 pts}.

**1.1** What is your working directory? Is it a full or relative path? {5 pts}

getwd()

## [1] "/Users/edithchung/Desktop/Intro to R/Lecture 2"

# getwd() is a relative ptah.

**Answer:**

**1.2** What are the base packages that are 'attached' to your R session? {5 pts}

sessionInfo()

## R version 3.3.3 (2017-03-06)  
## Platform: x86\_64-apple-darwin13.4.0 (64-bit)  
## Running under: OS X Yosemite 10.10.5  
##   
## locale:  
## [1] C  
##   
## attached base packages:  
## [1] stats graphics grDevices utils datasets methods base   
##   
## loaded via a namespace (and not attached):  
## [1] backports\_1.1.0 magrittr\_1.5 rprojroot\_1.2 formatR\_1.5   
## [5] tools\_3.3.3 htmltools\_0.3.6 yaml\_2.1.14 Rcpp\_0.12.12   
## [9] stringi\_1.1.5 rmarkdown\_1.6 knitr\_1.17 stringr\_1.2.0   
## [13] digest\_0.6.12 evaluate\_0.10.1

# attached base packages: stats graphics grDevices utils datasets methods  
# base

**Answer:**

### Question 2 {20 pts}.

**2.1** Create a vector with all integers from 1 to 100. How many of those integers are **not** divisible by 3? {5 pts}

v <- 1:100  
v1 <- v[c(-3 \* v)]  
v1

## [1] 1 2 4 5 7 8 10 11 13 14 16 17 19 20 22 23 25  
## [18] 26 28 29 31 32 34 35 37 38 40 41 43 44 46 47 49 50  
## [35] 52 53 55 56 58 59 61 62 64 65 67 68 70 71 73 74 76  
## [52] 77 79 80 82 83 85 86 88 89 91 92 94 95 97 98 100

length(v1)

## [1] 67

**Answer:**  
v

**2.2** Using the vector in 2.1 create a new vector that only includes odd indexes (i.e, v[3], v[5]). What are the values of every 7th element of that new vector? {5 pts}

v2 <- v[-2 \* v]  
v2

## [1] 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45  
## [24] 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91  
## [47] 93 95 97 99

v3 <- v2[seq(7, length(v2), 7)]  
v3

## [1] 13 27 41 55 69 83 97

**Answer:**

**2.3** What proportion of elements in vector created in 2.2 is greater than 71? Round your answer to only have 2 decimal places. {10 pts}

v3.subset <- subset(v3, v3 > 71)  
v3.subset

## [1] 83 97

length(v3.subset)

## [1] 2

x <- length(v3.subset)/length(v3)  
x

## [1] 0.2857143

y <- round(x, digits = 2)  
y

## [1] 0.29

**Answer:**

### Question 3 {20 pts}.

**3.1** Create the following matrix A.  
A  
25 | 43 | 13 |  
6 | 18 | 0 |  
12 | 2 | 13 |  
17 | 11 | 23 |  
6 | 18 | 5 |  
5 | 4 | 32 |

Create matrix B where each value is 60% higher than the one in A and round it up to the whole integer (hint: use ceiling()). For example, if value in A = 11, then corresponding value in B = 18. What is the sum of the last row of B matrix? {10 pts}

mata <- matrix(c(25, 6, 12, 17, 6, 5, 43, 18, 2, 11, 18, 4, 13, 0, 13, 23, 5,   
 32), ncol = 3, nrow = 6)  
mata

## [,1] [,2] [,3]  
## [1,] 25 43 13  
## [2,] 6 18 0  
## [3,] 12 2 13  
## [4,] 17 11 23  
## [5,] 6 18 5  
## [6,] 5 4 32

matb <- ceiling(mata \* 1.6)  
matb

## [,1] [,2] [,3]  
## [1,] 40 69 21  
## [2,] 10 29 0  
## [3,] 20 4 21  
## [4,] 28 18 37  
## [5,] 10 29 8  
## [6,] 8 7 52

**Answer:**

**3.2** Matrix multiplication is widely used in mathematics. It follows very specific rules: <https://www.mathsisfun.com/algebra/matrix-multiplying.html> . Create matrix C by multiplying matrix A by B. What is the dimension of C? What is the sum of the first column of C? {10 pts}

v1 <- matrix(c(25, 6, 12, 17, 6, 5, 43, 18, 2, 11, 18, 4, 13, 0, 13, 23, 5,   
 32), ncol = 3, nrow = 6)  
v1

## [,1] [,2] [,3]  
## [1,] 25 43 13  
## [2,] 6 18 0  
## [3,] 12 2 13  
## [4,] 17 11 23  
## [5,] 6 18 5  
## [6,] 5 4 32

v2 <- ceiling(v1 \* 1.6)  
v2

## [,1] [,2] [,3]  
## [1,] 40 69 21  
## [2,] 10 29 0  
## [3,] 20 4 21  
## [4,] 28 18 37  
## [5,] 10 29 8  
## [6,] 8 7 52

maxc <- v1 %\*% t(v2)  
maxc

## [,1] [,2] [,3] [,4] [,5] [,6]  
## [1,] 4240 1497 945 1955 1601 1177  
## [2,] 1482 582 192 492 582 174  
## [3,] 891 178 521 853 282 786  
## [4,] 1922 489 867 1525 673 1409  
## [5,] 1587 582 297 677 622 434  
## [6,] 1148 166 788 1396 422 1732

dim(maxc)

## [1] 6 6

sum(maxc[, 1])

## [1] 11270

**Answer:**

### Question 4 {20 pts}.

**4.1** R has a built-in vector of available colors (colors()). How many of those colors contain the word 'blue'? {20 pts}

colors()

## [1] "white" "aliceblue" "antiquewhite"   
## [4] "antiquewhite1" "antiquewhite2" "antiquewhite3"   
## [7] "antiquewhite4" "aquamarine" "aquamarine1"   
## [10] "aquamarine2" "aquamarine3" "aquamarine4"   
## [13] "azure" "azure1" "azure2"   
## [16] "azure3" "azure4" "beige"   
## [19] "bisque" "bisque1" "bisque2"   
## [22] "bisque3" "bisque4" "black"   
## [25] "blanchedalmond" "blue" "blue1"   
## [28] "blue2" "blue3" "blue4"   
## [31] "blueviolet" "brown" "brown1"   
## [34] "brown2" "brown3" "brown4"   
## [37] "burlywood" "burlywood1" "burlywood2"   
## [40] "burlywood3" "burlywood4" "cadetblue"   
## [43] "cadetblue1" "cadetblue2" "cadetblue3"   
## [46] "cadetblue4" "chartreuse" "chartreuse1"   
## [49] "chartreuse2" "chartreuse3" "chartreuse4"   
## [52] "chocolate" "chocolate1" "chocolate2"   
## [55] "chocolate3" "chocolate4" "coral"   
## [58] "coral1" "coral2" "coral3"   
## [61] "coral4" "cornflowerblue" "cornsilk"   
## [64] "cornsilk1" "cornsilk2" "cornsilk3"   
## [67] "cornsilk4" "cyan" "cyan1"   
## [70] "cyan2" "cyan3" "cyan4"   
## [73] "darkblue" "darkcyan" "darkgoldenrod"   
## [76] "darkgoldenrod1" "darkgoldenrod2" "darkgoldenrod3"   
## [79] "darkgoldenrod4" "darkgray" "darkgreen"   
## [82] "darkgrey" "darkkhaki" "darkmagenta"   
## [85] "darkolivegreen" "darkolivegreen1" "darkolivegreen2"   
## [88] "darkolivegreen3" "darkolivegreen4" "darkorange"   
## [91] "darkorange1" "darkorange2" "darkorange3"   
## [94] "darkorange4" "darkorchid" "darkorchid1"   
## [97] "darkorchid2" "darkorchid3" "darkorchid4"   
## [100] "darkred" "darksalmon" "darkseagreen"   
## [103] "darkseagreen1" "darkseagreen2" "darkseagreen3"   
## [106] "darkseagreen4" "darkslateblue" "darkslategray"   
## [109] "darkslategray1" "darkslategray2" "darkslategray3"   
## [112] "darkslategray4" "darkslategrey" "darkturquoise"   
## [115] "darkviolet" "deeppink" "deeppink1"   
## [118] "deeppink2" "deeppink3" "deeppink4"   
## [121] "deepskyblue" "deepskyblue1" "deepskyblue2"   
## [124] "deepskyblue3" "deepskyblue4" "dimgray"   
## [127] "dimgrey" "dodgerblue" "dodgerblue1"   
## [130] "dodgerblue2" "dodgerblue3" "dodgerblue4"   
## [133] "firebrick" "firebrick1" "firebrick2"   
## [136] "firebrick3" "firebrick4" "floralwhite"   
## [139] "forestgreen" "gainsboro" "ghostwhite"   
## [142] "gold" "gold1" "gold2"   
## [145] "gold3" "gold4" "goldenrod"   
## [148] "goldenrod1" "goldenrod2" "goldenrod3"   
## [151] "goldenrod4" "gray" "gray0"   
## [154] "gray1" "gray2" "gray3"   
## [157] "gray4" "gray5" "gray6"   
## [160] "gray7" "gray8" "gray9"   
## [163] "gray10" "gray11" "gray12"   
## [166] "gray13" "gray14" "gray15"   
## [169] "gray16" "gray17" "gray18"   
## [172] "gray19" "gray20" "gray21"   
## [175] "gray22" "gray23" "gray24"   
## [178] "gray25" "gray26" "gray27"   
## [181] "gray28" "gray29" "gray30"   
## [184] "gray31" "gray32" "gray33"   
## [187] "gray34" "gray35" "gray36"   
## [190] "gray37" "gray38" "gray39"   
## [193] "gray40" "gray41" "gray42"   
## [196] "gray43" "gray44" "gray45"   
## [199] "gray46" "gray47" "gray48"   
## [202] "gray49" "gray50" "gray51"   
## [205] "gray52" "gray53" "gray54"   
## [208] "gray55" "gray56" "gray57"   
## [211] "gray58" "gray59" "gray60"   
## [214] "gray61" "gray62" "gray63"   
## [217] "gray64" "gray65" "gray66"   
## [220] "gray67" "gray68" "gray69"   
## [223] "gray70" "gray71" "gray72"   
## [226] "gray73" "gray74" "gray75"   
## [229] "gray76" "gray77" "gray78"   
## [232] "gray79" "gray80" "gray81"   
## [235] "gray82" "gray83" "gray84"   
## [238] "gray85" "gray86" "gray87"   
## [241] "gray88" "gray89" "gray90"   
## [244] "gray91" "gray92" "gray93"   
## [247] "gray94" "gray95" "gray96"   
## [250] "gray97" "gray98" "gray99"   
## [253] "gray100" "green" "green1"   
## [256] "green2" "green3" "green4"   
## [259] "greenyellow" "grey" "grey0"   
## [262] "grey1" "grey2" "grey3"   
## [265] "grey4" "grey5" "grey6"   
## [268] "grey7" "grey8" "grey9"   
## [271] "grey10" "grey11" "grey12"   
## [274] "grey13" "grey14" "grey15"   
## [277] "grey16" "grey17" "grey18"   
## [280] "grey19" "grey20" "grey21"   
## [283] "grey22" "grey23" "grey24"   
## [286] "grey25" "grey26" "grey27"   
## [289] "grey28" "grey29" "grey30"   
## [292] "grey31" "grey32" "grey33"   
## [295] "grey34" "grey35" "grey36"   
## [298] "grey37" "grey38" "grey39"   
## [301] "grey40" "grey41" "grey42"   
## [304] "grey43" "grey44" "grey45"   
## [307] "grey46" "grey47" "grey48"   
## [310] "grey49" "grey50" "grey51"   
## [313] "grey52" "grey53" "grey54"   
## [316] "grey55" "grey56" "grey57"   
## [319] "grey58" "grey59" "grey60"   
## [322] "grey61" "grey62" "grey63"   
## [325] "grey64" "grey65" "grey66"   
## [328] "grey67" "grey68" "grey69"   
## [331] "grey70" "grey71" "grey72"   
## [334] "grey73" "grey74" "grey75"   
## [337] "grey76" "grey77" "grey78"   
## [340] "grey79" "grey80" "grey81"   
## [343] "grey82" "grey83" "grey84"   
## [346] "grey85" "grey86" "grey87"   
## [349] "grey88" "grey89" "grey90"   
## [352] "grey91" "grey92" "grey93"   
## [355] "grey94" "grey95" "grey96"   
## [358] "grey97" "grey98" "grey99"   
## [361] "grey100" "honeydew" "honeydew1"   
## [364] "honeydew2" "honeydew3" "honeydew4"   
## [367] "hotpink" "hotpink1" "hotpink2"   
## [370] "hotpink3" "hotpink4" "indianred"   
## [373] "indianred1" "indianred2" "indianred3"   
## [376] "indianred4" "ivory" "ivory1"   
## [379] "ivory2" "ivory3" "ivory4"   
## [382] "khaki" "khaki1" "khaki2"   
## [385] "khaki3" "khaki4" "lavender"   
## [388] "lavenderblush" "lavenderblush1" "lavenderblush2"   
## [391] "lavenderblush3" "lavenderblush4" "lawngreen"   
## [394] "lemonchiffon" "lemonchiffon1" "lemonchiffon2"   
## [397] "lemonchiffon3" "lemonchiffon4" "lightblue"   
## [400] "lightblue1" "lightblue2" "lightblue3"   
## [403] "lightblue4" "lightcoral" "lightcyan"   
## [406] "lightcyan1" "lightcyan2" "lightcyan3"   
## [409] "lightcyan4" "lightgoldenrod" "lightgoldenrod1"   
## [412] "lightgoldenrod2" "lightgoldenrod3" "lightgoldenrod4"   
## [415] "lightgoldenrodyellow" "lightgray" "lightgreen"   
## [418] "lightgrey" "lightpink" "lightpink1"   
## [421] "lightpink2" "lightpink3" "lightpink4"   
## [424] "lightsalmon" "lightsalmon1" "lightsalmon2"   
## [427] "lightsalmon3" "lightsalmon4" "lightseagreen"   
## [430] "lightskyblue" "lightskyblue1" "lightskyblue2"   
## [433] "lightskyblue3" "lightskyblue4" "lightslateblue"   
## [436] "lightslategray" "lightslategrey" "lightsteelblue"   
## [439] "lightsteelblue1" "lightsteelblue2" "lightsteelblue3"   
## [442] "lightsteelblue4" "lightyellow" "lightyellow1"   
## [445] "lightyellow2" "lightyellow3" "lightyellow4"   
## [448] "limegreen" "linen" "magenta"   
## [451] "magenta1" "magenta2" "magenta3"   
## [454] "magenta4" "maroon" "maroon1"   
## [457] "maroon2" "maroon3" "maroon4"   
## [460] "mediumaquamarine" "mediumblue" "mediumorchid"   
## [463] "mediumorchid1" "mediumorchid2" "mediumorchid3"   
## [466] "mediumorchid4" "mediumpurple" "mediumpurple1"   
## [469] "mediumpurple2" "mediumpurple3" "mediumpurple4"   
## [472] "mediumseagreen" "mediumslateblue" "mediumspringgreen"   
## [475] "mediumturquoise" "mediumvioletred" "midnightblue"   
## [478] "mintcream" "mistyrose" "mistyrose1"   
## [481] "mistyrose2" "mistyrose3" "mistyrose4"   
## [484] "moccasin" "navajowhite" "navajowhite1"   
## [487] "navajowhite2" "navajowhite3" "navajowhite4"   
## [490] "navy" "navyblue" "oldlace"   
## [493] "olivedrab" "olivedrab1" "olivedrab2"   
## [496] "olivedrab3" "olivedrab4" "orange"   
## [499] "orange1" "orange2" "orange3"   
## [502] "orange4" "orangered" "orangered1"   
## [505] "orangered2" "orangered3" "orangered4"   
## [508] "orchid" "orchid1" "orchid2"   
## [511] "orchid3" "orchid4" "palegoldenrod"   
## [514] "palegreen" "palegreen1" "palegreen2"   
## [517] "palegreen3" "palegreen4" "paleturquoise"   
## [520] "paleturquoise1" "paleturquoise2" "paleturquoise3"   
## [523] "paleturquoise4" "palevioletred" "palevioletred1"   
## [526] "palevioletred2" "palevioletred3" "palevioletred4"   
## [529] "papayawhip" "peachpuff" "peachpuff1"   
## [532] "peachpuff2" "peachpuff3" "peachpuff4"   
## [535] "peru" "pink" "pink1"   
## [538] "pink2" "pink3" "pink4"   
## [541] "plum" "plum1" "plum2"   
## [544] "plum3" "plum4" "powderblue"   
## [547] "purple" "purple1" "purple2"   
## [550] "purple3" "purple4" "red"   
## [553] "red1" "red2" "red3"   
## [556] "red4" "rosybrown" "rosybrown1"   
## [559] "rosybrown2" "rosybrown3" "rosybrown4"   
## [562] "royalblue" "royalblue1" "royalblue2"   
## [565] "royalblue3" "royalblue4" "saddlebrown"   
## [568] "salmon" "salmon1" "salmon2"   
## [571] "salmon3" "salmon4" "sandybrown"   
## [574] "seagreen" "seagreen1" "seagreen2"   
## [577] "seagreen3" "seagreen4" "seashell"   
## [580] "seashell1" "seashell2" "seashell3"   
## [583] "seashell4" "sienna" "sienna1"   
## [586] "sienna2" "sienna3" "sienna4"   
## [589] "skyblue" "skyblue1" "skyblue2"   
## [592] "skyblue3" "skyblue4" "slateblue"   
## [595] "slateblue1" "slateblue2" "slateblue3"   
## [598] "slateblue4" "slategray" "slategray1"   
## [601] "slategray2" "slategray3" "slategray4"   
## [604] "slategrey" "snow" "snow1"   
## [607] "snow2" "snow3" "snow4"   
## [610] "springgreen" "springgreen1" "springgreen2"   
## [613] "springgreen3" "springgreen4" "steelblue"   
## [616] "steelblue1" "steelblue2" "steelblue3"   
## [619] "steelblue4" "tan" "tan1"   
## [622] "tan2" "tan3" "tan4"   
## [625] "thistle" "thistle1" "thistle2"   
## [628] "thistle3" "thistle4" "tomato"   
## [631] "tomato1" "tomato2" "tomato3"   
## [634] "tomato4" "turquoise" "turquoise1"   
## [637] "turquoise2" "turquoise3" "turquoise4"   
## [640] "violet" "violetred" "violetred1"   
## [643] "violetred2" "violetred3" "violetred4"   
## [646] "wheat" "wheat1" "wheat2"   
## [649] "wheat3" "wheat4" "whitesmoke"   
## [652] "yellow" "yellow1" "yellow2"   
## [655] "yellow3" "yellow4" "yellowgreen"

grep("blue", colors())

## [1] 2 26 27 28 29 30 31 42 43 44 45 46 62 73 107 121 122  
## [18] 123 124 125 128 129 130 131 132 399 400 401 402 403 430 431 432 433  
## [35] 434 435 438 439 440 441 442 461 473 477 491 546 562 563 564 565 566  
## [52] 589 590 591 592 593 594 595 596 597 598 615 616 617 618 619

length(grep("blue", colors()))

## [1] 66

**Answer:**  
grep('blue', colors())