borrar.R

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#’ ---  
#’ title: "Informe de la pràctica 11"   
#’ output: word\_document  
#’ author: "Jose Calatayud Mateu"  
#’ ---  
  
#LLIURAMENT 11  
  
## Pas(1): Importació del fitxer  
  
library(xlsx)  
df.plantes<-read.xlsx(file="Plant\_height.xlsx",sheetIndex=1,   
 startRow=1, endRow=179, header=T,encoding="UTF-8")  
  
## Pas(2): Observació de les característiques  
  
#De quin tipus es l'objecte df.plantes?  
class(df.plantes)

## [1] "data.frame"

#Nombre de casos  
nrow(df.plantes)

## [1] 178

#Nombre de variables  
ncol(df.plantes)

## [1] 35

#De qui tipus son les variables?  
summary(df.plantes)

## sort\_number site Genus\_species Family   
## Min. : 89 Min. : 3.00 Length:178 Length:178   
## 1st Qu.: 8211 1st Qu.: 55.25 Class :character Class :character   
## Median :15789 Median :102.50 Mode :character Mode :character   
## Mean :16132 Mean :107.91   
## 3rd Qu.:24430 3rd Qu.:162.50   
## Max. :32699 Max. :222.00   
## growthform height loght Country   
## Length:178 Min. : 0.0322 Min. :-1.4921 Length:178   
## Class :character 1st Qu.: 0.7017 1st Qu.:-0.1538 Class :character   
## Mode :character Median : 3.2500 Median : 0.5106 Mode :character   
## Mean : 8.9090 Mean : 0.4583   
## 3rd Qu.:14.4750 3rd Qu.: 1.1603   
## Max. :61.0000 Max. : 1.7853   
## Site lat long entered.by   
## Length:178 Min. : 2.16 Min. :-178.57 Length:178   
## Class :character 1st Qu.:17.49 1st Qu.: -70.44 Class :character   
## Mode :character Median :32.16 Median : 26.68 Mode :character   
## Mean :31.29 Mean : 34.73   
## 3rd Qu.:41.57 3rd Qu.: 142.35   
## Max. :74.48 Max. : 179.97   
## alt temp diurn.temp isotherm   
## Min. : -71.00 Min. :-11.10 Min. : 4.600 Min. :1.800   
## 1st Qu.: 65.25 1st Qu.: 9.75 1st Qu.: 7.000 1st Qu.:4.000   
## Median : 189.50 Median : 18.00 Median : 9.750 Median :5.050   
## Mean : 393.59 Mean : 16.13 Mean : 9.911 Mean :5.016   
## 3rd Qu.: 578.75 3rd Qu.: 24.75 3rd Qu.:11.700 3rd Qu.:6.200   
## Max. :2966.00 Max. : 27.70 Max. :17.900 Max. :9.100   
## temp.seas temp.max.warm temp.min.cold temp.ann.range   
## Min. : 0.200 Min. : 6.00 Min. :-31.400 Min. : 5.40   
## 1st Qu.: 1.400 1st Qu.:24.12 1st Qu.: -2.400 1st Qu.:14.20   
## Median : 3.800 Median :29.80 Median : 5.850 Median :21.60   
## Mean : 4.271 Mean :27.54 Mean : 5.429 Mean :22.11   
## 3rd Qu.: 6.100 3rd Qu.:31.40 3rd Qu.: 17.200 3rd Qu.:29.18   
## Max. :15.100 Max. :41.70 Max. : 25.200 Max. :52.00   
## temp.mean.wetqr temp.mean.dryqr temp.mean.warmqr temp.mean.coldqr   
## Min. :-10.60 Min. :-16.20 Min. : 1.70 Min. :-25.500   
## 1st Qu.: 10.50 1st Qu.: 11.85 1st Qu.:17.07 1st Qu.: 2.675   
## Median : 21.15 Median : 18.45 Median :23.65 Median : 12.050   
## Mean : 17.49 Mean : 15.18 Mean :21.50 Mean : 10.625   
## 3rd Qu.: 26.07 3rd Qu.: 23.30 3rd Qu.:26.48 3rd Qu.: 22.875   
## Max. : 29.50 Max. : 27.50 Max. :31.90 Max. : 27.500   
## rain rain.wetm rain.drym rain.seas   
## Min. : 73.0 Min. : 12.0 Min. : 0.00 Min. : 10.00   
## 1st Qu.: 574.8 1st Qu.: 78.0 1st Qu.: 11.00 1st Qu.: 29.00   
## Median :1044.5 Median :156.0 Median : 29.50 Median : 41.00   
## Mean :1344.1 Mean :198.5 Mean : 47.22 Mean : 46.93   
## 3rd Qu.:2076.0 3rd Qu.:313.5 3rd Qu.: 77.50 3rd Qu.: 60.75   
## Max. :3991.0 Max. :521.0 Max. :238.00 Max. :118.00   
## rain.wetqr rain.dryqr rain.warmqr rain.coldqr   
## Min. : 31.0 Min. : 0.0 Min. : 0.0 Min. : 0.00   
## 1st Qu.: 218.5 1st Qu.: 40.0 1st Qu.: 111.0 1st Qu.: 91.25   
## Median : 429.0 Median :106.0 Median : 297.5 Median : 226.00   
## Mean : 539.2 Mean :163.0 Mean : 389.7 Mean : 263.46   
## 3rd Qu.: 881.2 3rd Qu.:258.5 3rd Qu.: 584.2 3rd Qu.: 373.25   
## Max. :1422.0 Max. :761.0 Max. :1136.0 Max. :1214.00   
## LAI NPP hemisphere   
## Length:178 Length:178 Min. :-1.00000   
## Class :character Class :character 1st Qu.:-1.00000   
## Mode :character Mode :character Median :-1.00000   
## Mean :-0.07865   
## 3rd Qu.: 1.00000   
## Max. : 1.00000

str(df.plantes)

## 'data.frame': 178 obs. of 35 variables:  
## $ sort\_number : num 1402 25246 11648 8168 22422 ...  
## $ site : num 193 103 54 144 178 59 27 118 154 106 ...  
## $ Genus\_species : chr "Acer\_macryophyllum" "Quararibea\_cordata" "Eragrostis\_dielsii" "Cistus\_salvifolius" ...  
## $ Family : chr "Sapindaceae" "Malvaceae" "Poaceae" "Cistaceae" ...  
## $ growthform : chr "Tree" "Tree" "Herb" "Shrub" ...  
## $ height : num 28 26.6 0.3 1.6 0.2 1.7 0.5 10 40 0.5 ...  
## $ loght : num 1.447 1.425 -0.523 0.204 -0.699 ...  
## $ Country : chr "USA" "Peru" "Australia" "Israel" ...  
## $ Site : chr "Oregon - McDun" "Manu" "Central Australia" "Hanadiv" ...  
## $ lat : num 44.6 12.2 23.8 32.6 41.6 ...  
## $ long : num -123.3 -70.5 133.8 34.9 -87 ...  
## $ entered.by : chr "Angela" "Angela" "Michelle" "Angela" ...  
## $ alt : num 179 386 553 115 200 95 157 2 71 2 ...  
## $ temp : num 10.8 24.5 20.9 19.9 9.7 22.6 16.8 27.7 15.5 26.4 ...  
## $ diurn.temp : num 11.8 10.8 16.3 9.7 10.7 7.4 10 4.8 11.4 5 ...  
## $ isotherm : num 4.4 7.4 4.8 4.4 2.8 5.4 4.8 8.8 3.2 7.4 ...  
## $ temp.seas : num 5.2 0.9 6 4.9 9.7 2.2 3.9 0.2 8.6 0.6 ...  
## $ temp.max.warm : num 27 31.2 37 30.7 28.6 29 26.1 30.6 32.9 29.9 ...  
## $ temp.min.cold : num 0.3 16.7 3.6 8.7 -9.5 15.5 5.5 25.2 -2.6 23.2 ...  
## $ temp.ann.range : num 26.7 14.5 33.4 22 38.1 13.5 20.6 5.4 35.5 6.7 ...  
## $ temp.mean.wetqr : num 4.9 25.1 28.1 13.6 21.6 25.4 21.2 27.9 15.6 26.8 ...  
## $ temp.mean.dryqr : num 17.4 23.2 14.8 25.3 -3.3 20.4 12.3 27.5 21.5 25.7 ...  
## $ temp.mean.warmqr: num 17.6 25.3 28.1 25.7 21.6 25.4 21.4 27.9 26.1 27.1 ...  
## $ temp.mean.coldqr: num 4.5 23.1 12.8 13.6 -3.3 19.7 11.5 27.5 3.8 25.5 ...  
## $ rain : num 1208 3015 278 598 976 ...  
## $ rain.wetm : num 217 416 37 159 104 216 157 300 129 309 ...  
## $ rain.drym : num 13 99 9 0 44 59 63 82 66 16 ...  
## $ rain.seas : num 69 45 42 115 23 46 29 34 18 66 ...  
## $ rain.wetqr : num 601 1177 109 408 299 ...  
## $ rain.dryqr : num 68 340 35 0 165 186 208 305 249 92 ...  
## $ rain.warmqr : num 75 928 109 2 299 600 385 855 268 659 ...  
## $ rain.coldqr : num 560 359 42 408 165 212 279 405 325 135 ...  
## $ LAI : chr "2.51" "4.26" "1.32" "1.01" ...  
## $ NPP : chr "572" "1405" "756" "359" ...  
## $ hemisphere : num 1 -1 -1 1 1 -1 -1 1 1 -1 ...

## Pas(3): Preparacio de l'objecte  
  
### (a)  
df.plantes[1:3,]

## sort\_number site Genus\_species Family growthform height loght  
## 1 1402 193 Acer\_macryophyllum Sapindaceae Tree 28.0 1.4471580  
## 2 25246 103 Quararibea\_cordata Malvaceae Tree 26.6 1.4248816  
## 3 11648 54 Eragrostis\_dielsii Poaceae Herb 0.3 -0.5228787  
## Country Site lat long entered.by alt temp diurn.temp  
## 1 USA Oregon - McDun 44.600 -123.334 Angela 179 10.8 11.8  
## 2 Peru Manu 12.183 -70.550 Angela 386 24.5 10.8  
## 3 Australia Central Australia 23.800 133.833 Michelle 553 20.9 16.3  
## isotherm temp.seas temp.max.warm temp.min.cold temp.ann.range temp.mean.wetqr  
## 1 4.4 5.2 27.0 0.3 26.7 4.9  
## 2 7.4 0.9 31.2 16.7 14.5 25.1  
## 3 4.8 6.0 37.0 3.6 33.4 28.1  
## temp.mean.dryqr temp.mean.warmqr temp.mean.coldqr rain rain.wetm rain.drym  
## 1 17.4 17.6 4.5 1208 217 13  
## 2 23.2 25.3 23.1 3015 416 99  
## 3 14.8 28.1 12.8 278 37 9  
## rain.seas rain.wetqr rain.dryqr rain.warmqr rain.coldqr LAI NPP hemisphere  
## 1 69 601 68 75 560 2.51 572 1  
## 2 45 1177 340 928 359 4.26 1405 -1  
## 3 42 109 35 109 42 1.32 756 -1

sapply(df.plantes,table)

## $sort\_number  
##   
## 89 150 227 1402 1593 1762 2173 2356 2357 2661 2720 2834 3156   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 3175 3358 3646 3876 3943 3971 4101 4175 4297 4330 4331 4332 4583   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 4610 4614 4619 4954 5003 5079 5226 5464 5478 6529 6597 6781 6787   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 6851 7039 7054 7867 8122 8168 8341 8736 8880 8927 9078 9244 9565   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 9641 10189 10460 10684 10692 10796 10986 11188 11205 11224 11305 11376 11477   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 11648 11723 11775 11884 12031 12043 12046 12089 12090 12094 12097 12303 12539   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 12541 12604 12619 12621 13286 13426 13427 14954 15377 15651 15714 15864 15925   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 16107 16438 16616 16908 17329 17755 17783 17982 18073 18104 18174 18175 18176   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 18226 18392 18833 19298 19395 19569 19797 19849 20367 20585 21013 21230 21232   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 21605 21730 21743 21747 21930 21931 22103 22359 22422 22657 22732 22889 23390   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 23821 24129 24239 24493 24893 24987 25017 25068 25129 25151 25246 25274 25823   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 25921 26007 26025 26205 26391 26532 26673 26983 27405 27860 28046 28244 29075   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 29156 29331 29608 29609 29888 30008 30075 30141 30345 30396 30971 31432 31945   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 32120 32237 32296 32313 32675 32688 32694 32697 32699   
## 1 1 1 1 1 1 1 1 1   
##   
## $site  
##   
## 3 4 5 6 7 8 9 10 11 12 13 14 15 16 18 19 20 21 22 23   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 24 25 26 27 28 29 30 31 32 34 37 38 40 41 42 43 44 46 48 49   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 50 51 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 91 92   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 93 94 95 96 97 99 100 101 102 103 104 105 106 107 109 110 111 112 113 114   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 115 116 117 118 121 122 123 126 129 130 132 134 135 137 138 139 140 141 142 143   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 144 145 147 148 149 150 151 152 154 156 158 159 161 163 164 165 167 170 171 172   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 173 174 176 177 178 179 180 183 189 192 193 194 195 196 197 198 199 200 201 202   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 203 204 205 207 208 209 210 211 212 213 214 215 216 217 218 220 221 222   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
##   
## $Genus\_species  
##   
## \_8324 Abies\_veitchii   
## 1 1   
## Acacia\_aneura Acacia\_berlandieri   
## 1 1   
## Acer\_macryophyllum Acmena\_graveolens   
## 1 1   
## Adenanthos\_cygnorum Aesculus\_californica   
## 1 1   
## Alchornea\_castaneaefolia Allocasuarina\_sp   
## 1 1   
## Alloteropsis\_semialata Amelanchier\_arborea   
## 2 1   
## Ampelocera\_hottlei Andropogon\_greenwayi   
## 1 1   
## Aporusa\_globifera Aquilegia\_caerulea   
## 1 1   
## Ardisia\_tenera Ascarina\_swamyana   
## 1 1   
## Astragalus\_cruciatus Astronidium\_parviflorum   
## 1 1   
## Atherosperma\_moschatum Austrocedrus\_chilensis   
## 1 1   
## Baccharis\_divaricata Bambusa\_weberbaueri   
## 1 1   
## Banksia\_hookeriana Banksia\_tricuspis   
## 2 1   
## Berlinia\_grandiflora Betula\_nana   
## 1 2   
## Betula\_pendula Bouteloua\_gracilis   
## 1 1   
## Brackenridgea\_nitida Bridelia\_micrantha   
## 1 1   
## Brunia\_albifora Cakile\_edentula   
## 1 1   
## Calamagrostis\_stricta Carnegiea\_gigantea   
## 1 1   
## Carya\_ovata Casearia\_stenophylla   
## 1 1   
## Casimiroa\_greggii Cassiope\_tetragona   
## 1 1   
## Ceanothus\_greggii Cecropia\_obtusifolia   
## 1 1   
## Chionochloa\_pallens Cirsium\_vulgare   
## 1 1   
## Cistus\_salvifolius Clidemia\_sericea   
## 1 1   
## Coprosma\_robusta Corema\_conradi   
## 1 1   
## Cornus\_sp Corylus\_avellana   
## 1 1   
## Corymbia\_maculata Crassula\_rupestris   
## 1 1   
## Cupaniopsis\_anacardioides Cyathocalyx\_insularis   
## 1 1   
## Decaspermum\_cryptanthum Dicksonia\_antarctica   
## 1 1   
## Diospyros\_borneensis Diospyros\_gillespiei   
## 1 1   
## Dombeya\_ciliata Duguetia\_surinamensis   
## 1 1   
## Elaeocarpus\_pyriformis Elateriospermum\_tapos   
## 1 1   
## Elatostema\_nemorosum Eleusine\_aegyptica   
## 1 1   
## Empetrum\_nigrum Englerophytum\_natalense   
## 1 1   
## Eragrostis\_dielsii Eremophila\_forrestii   
## 1 1   
## Erigeron\_glaucus Erucastrum\_gallicum   
## 1 1   
## Eucalyptus\_gillenii Eucalyptus\_miniata   
## 1 1   
## Eucalyptus\_oblongifolia Eucalyptus\_socialis   
## 1 1   
## Eucalyptus\_sp2 Eucalyptus\_sp4   
## 1 1   
## Eucalyptus\_sp5 Euphorbia\_characias   
## 1 1   
## Fagus\_crenata Fagus\_sylvatica   
## 1 1   
## Ferocactus\_cylindraceus Festuca\_gracillima   
## 1 1   
## Festuca\_novae-zealandiae Gardenia\_actinocarpa   
## 1 1   
## Gentiana\_campestris Gentiana\_cruciata   
## 1 1   
## Hakea\_rostrata Heliconia\_acuminata   
## 1 1   
## Heteropogon\_triticeus Hibiscus\_tiliaceus   
## 1 1   
## Hirtella\_triandra Homalium\_betulifolium   
## 1 1   
## Hybanthus\_prunifolius Impatiens\_capensis   
## 1 1   
## Ipomopsis\_aggregata Ischaemum\_nativitatis   
## 1 1   
## Juniperus\_virginiana Larix\_olgensis   
## 1 1   
## Larrea\_tridentata Lepechinia\_calycina   
## 1 1   
## Lepironia\_articulata Leptospermum\_continentale   
## 1 1   
## Leucadendron\_corymbosum Leucadendron\_meridianum   
## 1 1   
## Leucadendron\_sp Leucopogon\_septentrionalis   
## 1 1   
## Linanthus\_sp Ludwigia\_leptocarpa   
## 1 1   
## Maesa\_tongensis Mallotus\_japonicus   
## 1 1   
## Maranthes\_glabra Melicytus\_fasciger   
## 1 1   
## Melochia\_longepetiolata Morus\_boninensis   
## 1 1   
## Myristica\_macrantha Ocotea\_meziana   
## 1 1   
## Opuntia\_acanthocarpa Opuntia\_aurantiaca   
## 1 1   
## Panicum\_sp Paraneurachne\_muelleri   
## 1 1   
## Paraserianthes\_toona Parashorea\_malaanonan   
## 1 1   
## Pedicularis\_hirsuta Pedicularis\_lapponica   
## 1 1   
## Persoonia\_lanceolata Phaleria\_ixoroides   
## 1 1   
## Phlox\_bifida Phyllostylon\_rhamnoides   
## 1 1   
## Picea\_mariana Pinus\_ponderosa   
## 1 1   
## Piranhea\_sp Planchonia\_careya   
## 1 1   
## Polygonum\_lapathifolium Potentilla\_nivea   
## 1 1   
## Pourouma\_minor Premna\_serratifolia   
## 1 1   
## Pseudotsuga\_menziesii Psychotria\_carthagenensis   
## 1 1   
## Pteridium\_esculentum Pteronia\_pallens   
## 1 1   
## Pullea\_perryana Pultenaea\_microphylla   
## 1 1   
## Quararibea\_cordata Quercus\_calliprinos   
## 1 1   
## Ratibida\_columnifera Retama\_sphaerocarpa   
## 1 1   
## Rhizophora\_mucronata Rhododendron\_macrophyllum   
## 1 1   
## Richella\_monosperma Rosa\_acicularis   
## 1 1   
## Rubus\_chamaemorus Rumex\_acetosa   
## 1 1   
## Salix\_lapponum Sarcopoterium\_spinosum   
## 1 1   
## Sclerolobium\_paniculatum Senecio\_filaginoides   
## 1 1   
## Sesbania\_grandiflora Sorbus\_aucuparia   
## 1 1   
## Sorocea\_pileata Spirostachys\_africanus   
## 1 1   
## Stipa\_sp Stipa\_speciosa   
## 1 1   
## Syncarpia\_glomulifera Syzygium\_brackenridgei   
## 1 1   
## Tachigali\_sp Tapeinosperma\_grande   
## 1 1   
## Thalictrum\_thalictroides Themeda\_triandra   
## 1 1   
## Triglochin\_palustre Vaccinium\_vitis-idaea   
## 1 1   
## Viola\_magellanica Vulpia\_microstachys   
## 1 1   
## Weinmannia\_richii Xanthium\_occidentale   
## 1 1   
## Xanthorrhoea\_preissii   
## 1   
##   
## $Family  
##   
## Annonaceae Asteraceae Atherospermataceae Balsaminaceae   
## 3 7 1 1   
## Betulaceae Brassicaceae Bruniaceae Cactaceae   
## 4 2 1 4   
## Casuarinaceae Chloranthaceae Chrysobalanaceae Cistaceae   
## 1 1 2 1   
## Cornaceae Crassulaceae Cunoniaceae Cupressaceae   
## 1 1 2 2   
## Cyperaceae Dennstaedtiaceae Dicksoniaceae Dipterocarpaceae   
## 1 1 1 1   
## Ebenaceae Elaeocarpaceae Ericaceae Euphorbiaceae   
## 2 1 6 5   
## Fabaceae - C Fabaceae - M Fabaceae - P Fagaceae   
## 3 3 4 3   
## Gentianaceae Heliconiaceae Juglandaceae Juncaginaceae   
## 2 1 1 1   
## Lamiaceae Lauraceae Lecythidaceae Maesaceae   
## 2 1 1 1   
## Malvaceae Melastomataceae Moraceae Myristicaceae   
## 4 2 2 1   
## Myrsinaceae Myrtaceae NA Ochnaceae   
## 2 13 1 1   
## Onagraceae Orobanchaceae Phyllanthaceae Picrodendraceae   
## 1 2 2 1   
## Pinaceae Poaceae Polemoniaceae Polygonaceae   
## 5 19 3 2   
## Proteaceae Ranunculaceae Rhamnaceae Rhizophoraceae   
## 9 2 1 1   
## Rosaceae Rubiaceae Rutaceae Salicaceae   
## 6 3 1 3   
## Sapindaceae Sapotaceae Scrophulariaceae Thymelaeaceae   
## 3 1 1 1   
## Ulmaceae Urticaceae Violaceae Xanthorrhoeaceae   
## 2 3 3 1   
## Zygophyllaceae   
## 1   
##   
## $growthform  
##   
## Fern Herb Herb/Shrub NA Shrub Shrub/Tree Tree   
## 1 44 1 10 49 12 61   
##   
## $height  
##   
## 0.0322 0.04 0.05 0.07 0.08 0.11   
## 1 1 2 1 3 1   
## 0.14 0.15 0.158 0.2 0.22 0.233   
## 1 1 1 6 1 1   
## 0.239 0.246 0.25 0.28 0.3 0.35   
## 1 1 1 1 2 1   
## 0.4 0.45 0.5 0.55 0.6 0.7   
## 1 1 9 2 4 1   
## 0.707 0.72 0.75 0.8 0.81 1   
## 1 1 1 3 1 3   
## 1.05 1.15 1.5 1.584893192 1.6 1.68   
## 1 1 3 1 2 1   
## 1.7 1.71 1.8 1.94 2 2.02   
## 4 1 1 1 4 1   
## 2.4 2.5 2.8 2.9 3 3.5   
## 1 2 1 2 7 2   
## 3.8 4 4.5 5 6 7   
## 1 4 2 4 5 6   
## 8 9 9.67 10 11 12   
## 3 2 1 6 1 3   
## 12.4 12.5 13 13.5 14.8 15   
## 1 1 1 1 1 6   
## 16 18 18.1 19 20 23.5   
## 4 1 1 2 5 1   
## 24 25 26.6 28 29.3 30   
## 1 2 1 2 1 6   
## 32 34 35 39 39.6 40   
## 3 1 2 1 1 1   
## 41 61   
## 1 1   
##   
## $loght  
##   
## -1.492144128 -1.397940009 -1.301029996 -1.15490196 -1.096910013 -0.958607315   
## 1 1 2 1 3 1   
## -0.853871964 -0.823908741 -0.801342913 -0.698970004 -0.657577319 -0.632644079   
## 1 1 1 6 1 1   
## -0.621602099 -0.609064893 -0.602059991 -0.552841969 -0.522878745 -0.455931956   
## 1 1 1 1 2 1   
## -0.397940009 -0.346787486 -0.301029996 -0.259637311 -0.22184875 -0.15490196   
## 1 1 9 2 4 1   
## -0.150580586 -0.142667504 -0.124938737 -0.096910013 -0.091514981 0   
## 1 1 1 3 1 3   
## 0.021189299 0.06069784 0.176091259 0.2 0.204119983 0.225309282   
## 1 1 3 1 2 1   
## 0.230448921 0.23299611 0.255272505 0.28780173 0.301029996 0.305351369   
## 4 1 1 1 4 1   
## 0.380211242 0.397940009 0.447158031 0.462397998 0.477121255 0.544068044   
## 1 2 1 2 7 2   
## 0.579783597 0.602059991 0.653212514 0.698970004 0.77815125 0.84509804   
## 1 4 2 4 5 6   
## 0.903089987 0.954242509 0.985426474 1 1.041392685 1.079181246   
## 3 2 1 6 1 3   
## 1.093421685 1.096910013 1.113943352 1.130333768 1.170261715 1.176091259   
## 1 1 1 1 1 6   
## 1.204119983 1.255272505 1.257678575 1.278753601 1.301029996 1.371067862   
## 4 1 1 2 5 1   
## 1.380211242 1.397940009 1.424881637 1.447158031 1.46686762 1.477121255   
## 1 2 1 2 1 6   
## 1.505149978 1.531478917 1.544068044 1.591064607 1.597695186 1.602059991   
## 3 1 2 1 1 1   
## 1.612783857 1.785329835   
## 1 1   
##   
## $Country  
##   
## Argentina Australia Brazil Brunei   
## 8 35 2 1   
## Canada China Costa Rica Estonia   
## 2 2 1 1   
## Fiji Finland France? Germany   
## 23 2 1 1   
## Greenland Israel Japan Liberia   
## 5 3 5 1   
## Malaysia Mexico Micronesia NA   
## 2 4 1 14   
## Netherlands New Caledonia New Zealand Norway   
## 1 1 3 2   
## Panama Papua New Guinea Peru Republic of Congo   
## 2 1 6 1   
## Rhode Island South Africa Spain Sweden   
## 1 9 2 4   
## Sweeden Switzerland Tanzania USA   
## 1 1 1 25   
## Western Oregon Zambia   
## 1 2   
##   
## $Site  
##   
## a-ngau ab   
## 1 1   
## Abisko - forest Abisko - Paddus   
## 1 1   
## abk abkngau   
## 1 1   
## abko abkt   
## 1 1   
## abngau abo   
## 1 1   
## abot abrambi   
## 1 1   
## abt Adelaide - Brookfield Chenopod   
## 1 1   
## Adelaide - Brookfield Mallee Adelaide - Cox's scrub   
## 1 1   
## Adelaide - ferries Adulam   
## 1 1   
## ak ako   
## 1 1   
## Alaska - 12 Mile Alaska - Bonanza   
## 1 1   
## Alaska campus Alaska, Yukon delta   
## 1 1   
## Alice - the gap ao   
## 1 1   
## aot Armidale - Goonoowigal   
## 1 1   
## at atngau   
## 1 1   
## b Bariloche   
## 1 1   
## Barvaria BCI   
## 1 1   
## bt Bunyip - Melbourne   
## 1 1   
## Cairns - Daintree canopy crane California   
## 1 2   
## Canterbury Cape York   
## 1 1   
## Central Australia Chajul   
## 1 1   
## Chamela Christmas Island   
## 1 1   
## Colorado Congo - bai   
## 3 1   
## Darwin - East point disko island   
## 1 1   
## Duke Forest, Durham, NC fulanga   
## 1 1   
## Green's Bush - Melbourne Hanadiv   
## 1 1   
## Howard Springs, Darwin Huon Rd, Tasmania   
## 2 1   
## Indiana Dunes Jasper Ridge - Chaparral   
## 1 1   
## Jasper Ridge - Oak forest Jasper Ridge - Serpentine   
## 1 1   
## k Kangerlussuaq - dry   
## 1 1   
## Kangerlussuaq - wet Kansas   
## 1 1   
## Kunoth Paddock - Alice Springs Kuringai - Challenger   
## 2 1   
## Kuringai - Diatreme Kuringai Chase, Sydney   
## 1 1   
## Lehavim Linares - Puenta Viejo   
## 1 1   
## Linares - thornscrub Los Amigos - Bamboo   
## 1 1   
## Los Amigos - successional Los Amigos -terrace   
## 1 1   
## Los Amigos floodplain Manu   
## 1 2   
## Marshall Islands Melville Island   
## 1 1   
## Mendoza - Payunia Motupore Island   
## 1 1   
## Mt Field, Tasmania NA   
## 1 45   
## Nelson Norway   
## 1 1   
## Nova Scotia Oregon   
## 1 1   
## Oregon - McDun Oregon - Yaquina Head   
## 1 1   
## Panama - BCI Patagonia   
## 1 1   
## Perth - Darling Scarp Perth - Melaleuca Park   
## 1 1   
## Puerto Madryn - dune Puerto Madryn - steppe   
## 1 1   
## Quebec Queensland   
## 1 1   
## Reunion Island Rio Turbio - heath   
## 1 1   
## Rio Turbio - Nothofagus Rockies   
## 1 1   
## Serengeti, Naabi hill Sodermanland   
## 1 1   
## South Carolina Stellenbosch - fynbos   
## 1 1   
## Stellenbosch - Karoo Stellenbosch - renosterveld   
## 1 1   
## Stockholm t   
## 1 1   
## Tasmania Toowoomba   
## 1 1   
## Townsville savanna Townsville Vine Thicket   
## 1 1   
## Tucson Tucson - Sonoran desert   
## 1 1   
## Tucuman - Yungas North Tucuman - Yungas South   
## 1 1   
## Twin springs, Virginia Umea   
## 1 1   
## USA Viti Levu   
## 1 1   
## WA Western Australia   
## 1 1   
## Yap Zackenberg - hill   
## 1 1   
## Zackenberg - salix Zambia - Mateshi   
## 1 1   
## Zambia - miombo Zululand - forest   
## 1 1   
## Zululand - ledube Zululand - Mbuzane   
## 1 1   
##   
## $lat  
##   
## 2.16 2.5 2.983 3 3.217 4.083 4.5 4.967 5.5 9 9.15   
## 1 1 1 1 1 1 1 1 1 1 1   
## 9.167 9.5 10.417 10.433 10.983 11.5 12.183 12.406 12.494 12.552 12.566   
## 1 2 1 1 1 1 2 1 2 1 2   
## 12.567 13.249 13.253 14.967 15.933 16.1 16.103 16.106 16.583 16.721 16.858   
## 1 1 1 1 1 1 1 1 1 1 1   
## 16.956 17 17.081 17.231 17.329 17.356 17.447 17.472 17.552 17.564 17.667   
## 1 1 1 1 1 1 1 1 1 1 1   
## 17.742 17.758 17.783 17.8 17.846 17.917 18.15 18.383 18.583 18.967 19.133   
## 1 1 1 1 1 1 1 1 1 1 1   
## 19.332 19.337 19.5 21 21.5 21.96 23.533 23.747 23.795 23.8 24.65   
## 1 1 1 1 1 1 2 1 1 1 1   
## 24.749 24.786 26.65 26.763 28.072 28.085 28.221 28.234 29.567 29.815 29.867   
## 1 1 1 1 1 1 1 1 1 1 1   
## 30.167 30.333 30.517 31.356 31.5 31.689 32.02 32.31 32.555 32.6 33.167   
## 1 1 1 1 1 1 1 1 1 1 1   
## 33.2 33.217 33.383 33.448 33.578 33.595 33.609 33.633 33.65 33.992 34.317   
## 1 1 1 1 1 1 1 1 1 1 1   
## 34.32 34.347 34.55 34.583 34.935 35.235 35.341 35.35 35.8 35.967 36.083   
## 1 1 1 1 1 1 1 1 1 1 1   
## 36.25 36.817 36.917 37.133 37.4 38.01 38.217 38.43 38.75 38.867 38.966   
## 1 1 1 1 3 1 1 1 1 2 1   
## 39.083 40.817 41.242 41.417 41.617 41.667 42 42.333 42.679 42.683 42.769   
## 1 1 1 1 1 1 1 1 1 1 1   
## 42.79 42.921 43 43.033 43.533 44 44.217 44.6 44.667 44.683 45.417   
## 1 1 1 1 1 1 1 1 1 1 1   
## 45.817 46.5 47.533 49.867 51.575 51.578 52.8 58.5 58.867 58.953 59.333   
## 1 1 1 1 1 1 1 1 1 1 1   
## 60 61.25 61.6 62 63.817 64.769 64.86 65.391 66.973 68.324 68.329   
## 1 1 1 1 1 1 1 1 2 1 1   
## 68.606 69.25 74.474 74.476   
## 1 1 1 1   
##   
## $long  
##   
## -178.567 -165.5 -148.283 -147.862 -145.854 -124.072 -123.334 -122.417   
## 1 1 1 1 1 1 1 1   
## -122.236 -122.233 -122.224 -122 -121.95 -116.883 -116.4 -116   
## 1 2 1 1 1 1 1 1   
## -111.233 -110.739 -107.783 -106.987 -106.967 -105.043 -99.799 -99.515   
## 1 1 1 1 1 1 1 1   
## -96.583 -95.117 -90.987 -89.9 -89 -86.95 -83.983 -82.464   
## 2 1 1 1 1 1 1 1   
## -81.75 -79.85 -79.849 -79 -76.15 -72.315 -72.312 -71.425   
## 1 1 1 1 1 1 1 1   
## -71.25 -70.917 -70.55 -70.111 -70.105 -70.099 -70.093 -70   
## 1 1 1 1 1 1 1 1   
## -68.824 -65.717 -65.333 -64.854 -64.101 -64.092 -63.117 -61.7   
## 1 1 1 1 1 1 1 1   
## -60 -53.6 -52.667 -50.569 -50.568 -47.883 -20.629 -20.536   
## 1 1 1 1 1 1 1 1   
## -7.5 -2.367 2.1 4.333 7 7.5 10.45 16.153   
## 1 1 1 1 1 1 1 1   
## 16.85 17.606 17.61 18.836 18.843 18.975 19.048 19.457   
## 1 1 1 1 1 1 1 1   
## 19.917 20.267 22.283 25 26.367 27 30.047 30.28   
## 2 1 1 2 1 2 1 1   
## 31.794 32.017 32.039 34.835 34.935 34.938 35.1 35.483   
## 1 1 1 1 1 1 1 1   
## 55.65 101.2 102.3 102.333 105.667 113.7 115.167 115.233   
## 1 1 1 1 1 1 1 2   
## 115.25 115.886 116.044 117.8 130.4 130.82 130.967 131.108   
## 1 1 1 1 1 1 1 2   
## 133.55 133.748 133.833 133.863 135.5 138.167 138.35 138.74   
## 1 2 1 1 1 1 1 1   
## 139.132 139.503 139.517 140.833 142.133 142.417 143.583 144.922   
## 1 1 1 1 1 1 1 1   
## 145.133 145.367 145.446 145.62 146.35 146.669 146.755 146.773   
## 1 1 1 1 1 1 1 1   
## 147.267 147.275 151.121 151.2 151.276 151.292 151.729 165.5   
## 1 1 1 1 1 1 1 1   
## 168 171.55 171.75 173 178 178.142 178.167 178.283   
## 1 1 1 1 1 1 1 1   
## 178.356 178.392 178.508 178.577 178.65 178.675 178.706 178.847   
## 1 1 1 1 1 1 1 1   
## 178.873 178.917 178.983 178.998 179.069 179.089 179.242 179.604   
## 1 1 1 1 2 1 1 1   
## 179.967   
## 1   
##   
## $entered.by  
##   
## Angela Laura Michelle Nate   
## 144 28 4 2   
##   
## $alt  
##   
## -71 0 1 2 3 4 5 6 7 8 10 11 12 13 15 17   
## 1 1 3 5 2 1 1 1 1 1 1 1 1 2 1 1   
## 21 26 28 30 33 37 38 41 44 47 50 52 54 60 65 66   
## 1 2 1 3 1 1 1 2 3 1 1 1 1 1 1 1   
## 71 72 74 75 76 79 83 84 85 89 94 95 97 99 106 111   
## 2 1 1 3 1 2 1 1 1 1 2 2 1 3 1 1   
## 114 115 116 134 150 151 152 157 161 164 165 174 177 179 188 191   
## 1 1 1 1 2 1 1 1 1 1 3 1 1 2 1 1   
## 200 209 214 217 227 228 230 237 256 263 265 267 274 280 289 312   
## 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1   
## 314 324 346 350 354 355 357 358 366 371 379 382 386 387 394 403   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 407 415 500 501 521 530 550 553 554 587 611 614 643 646 648 686   
## 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 688 690 701 702 704 713 732 736 737 740 747 749 840 860 867 900   
## 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1   
## 920 935 966 971 1039 1070 1100 1108 1388 1446 1502 1506 1520 1550 1608 1650   
## 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1   
## 2090 2177 2698 2966   
## 1 1 1 1   
##   
## $temp  
##   
## -11.1 -10.5 -6.4 -5.7 -5.1 -4.3 -2.9 -2.1 -1.2 -1 -0.7 0.2 1.2   
## 1 1 1 1 2 1 1 1 1 1 1 1 1   
## 1.3 2.4 2.7 3.4 3.5 3.7 4.2 4.3 4.5 4.8 4.9 5 5.1   
## 1 1 1 1 1 2 1 1 1 1 1 2 1   
## 5.4 6.2 6.4 7 7.5 7.8 7.9 8 8.5 9 9.1 9.4 9.5   
## 1 1 1 2 1 1 1 1 1 1 1 1 1   
## 9.6 9.7 9.9 10.1 10.6 10.8 10.9 12 12.1 12.4 12.7 13 13.5   
## 1 1 1 1 1 1 1 1 1 1 1 3 2   
## 13.6 13.7 13.8 14.9 15.3 15.5 15.6 15.7 16.2 16.4 16.5 16.6 16.7   
## 1 2 2 2 3 1 1 2 2 1 1 1 3   
## 16.8 16.9 17 17.5 17.9 18.1 18.2 18.3 18.6 18.9 19.1 19.3 19.4   
## 2 1 3 1 1 1 1 1 2 2 1 1 1   
## 19.8 19.9 20.1 20.2 20.4 20.5 20.7 20.8 20.9 21 21.2 22.3 22.5   
## 1 2 1 1 2 2 1 1 2 2 1 1 1   
## 22.6 22.7 22.9 23 23.4 23.5 23.9 24.1 24.3 24.5 24.6 24.8 24.9   
## 2 2 1 1 1 1 3 1 1 1 2 9 5   
## 25 25.1 25.2 25.3 25.4 25.5 25.8 25.9 26 26.2 26.3 26.4 26.5   
## 3 1 2 1 2 1 1 2 4 1 1 1 3   
## 26.8 27 27.1 27.2 27.3 27.5 27.7   
## 1 1 1 1 2 1 1   
##   
## $diurn.temp  
##   
## 4.6 4.8 5 5.4 5.5 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 7 7.1 7.3   
## 2 1 1 1 1 2 10 15 1 1 2 2 3 5 2 2   
## 7.4 7.5 7.7 8 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9 9.1 9.4 9.5   
## 1 2 2 1 2 3 1 4 1 2 6 1 1 1 3 2   
## 9.6 9.7 9.8 9.9 10 10.1 10.2 10.3 10.5 10.6 10.7 10.8 10.9 11 11.1 11.2   
## 1 4 1 2 3 1 3 1 8 1 3 3 2 1 1 5   
## 11.3 11.4 11.5 11.6 11.7 11.8 11.9 12 12.4 12.5 12.7 12.8 12.9 13 13.3 13.4   
## 2 2 2 2 2 1 1 1 2 2 2 4 1 1 2 2   
## 13.5 13.6 13.7 13.8 13.9 14 14.3 14.5 15 15.3 15.7 16 16.3 16.6 16.9 17.2   
## 2 1 1 2 1 1 1 1 1 1 1 2 3 2 2 1   
## 17.4 17.9   
## 1 1   
##   
## $isotherm  
##   
## 1.8 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.8 3.9 4 4.1 4.2 4.4   
## 1 1 6 4 3 4 2 3 1 4 2 3 3 2 2 3 2 2 1 3   
## 4.5 4.6 4.7 4.8 4.9 5 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6 6.1 6.2 6.3 6.4   
## 5 8 4 12 5 3 8 5 5 2 5 2 1 3 5 4 2 3 7 6   
## 6.5 6.6 6.7 6.9 7 7.2 7.3 7.4 7.5 7.6 8 8.3 8.5 8.8 8.9 9 9.1   
## 4 1 1 1 1 2 5 4 1 3 1 1 2 1 1 1 1   
##   
## $temp.seas  
##   
## 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7   
## 3 1 2 2 2 3 3 2 5 6 6 7 4 4 1 2   
## 1.8 2 2.1 2.2 2.3 2.4 2.5 2.6 2.8 3 3.1 3.2 3.3 3.4 3.5 3.6   
## 1 1 2 1 3 2 1 1 2 2 3 2 4 1 2 4   
## 3.7 3.8 3.9 4 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 5 5.1 5.2   
## 3 3 3 3 2 4 2 1 2 2 1 2 1 1 1 1   
## 5.3 5.4 5.5 5.7 5.9 6 6.1 6.2 6.6 6.7 6.9 7.1 7.3 7.4 7.5 7.6   
## 4 1 2 2 1 4 4 1 1 1 2 3 1 2 1 1   
## 7.8 8 8.1 8.2 8.3 8.4 8.6 8.7 8.9 9 9.3 9.7 9.9 10 13.9 14.1   
## 1 2 1 2 3 1 3 2 1 3 3 1 1 3 1 1   
## 15.1   
## 1   
##   
## $temp.max.warm  
##   
## 6 6.5 8.3 10 13.8 14 14.1 14.5 14.6 14.8 16.5 17.5 18.2 18.5 18.9 19   
## 1 1 1 1 1 2 2 1 1 2 1 1 1 1 1 1   
## 19.1 19.6 19.9 20.3 20.4 20.6 20.7 20.9 21 21.2 21.3 21.5 21.7 21.8 22.4 22.5   
## 1 1 1 1 2 1 1 1 1 2 1 1 1 2 1 1   
## 22.6 22.8 22.9 23.5 23.6 24.1 24.2 24.4 24.5 25 25.3 25.4 25.7 25.8 25.9 26   
## 1 1 1 2 1 1 1 2 1 1 1 1 1 1 1 1   
## 26.1 26.7 27 27.2 27.3 27.4 27.6 27.7 27.8 27.9 28.4 28.5 28.6 28.7 28.9 29   
## 2 1 1 2 1 2 1 4 1 1 1 1 1 1 2 1   
## 29.1 29.3 29.5 29.6 29.8 29.9 30 30.1 30.2 30.3 30.4 30.5 30.6 30.7 31 31.1   
## 1 4 2 2 3 2 3 8 6 2 3 2 2 5 1 1   
## 31.2 31.4 31.5 31.6 31.7 31.8 31.9 32.2 32.3 32.4 32.5 32.8 32.9 33.2 33.4 33.6   
## 3 6 2 2 2 2 2 2 1 1 3 1 2 1 1 1   
## 33.8 33.9 34 34.4 34.6 35 35.1 35.2 36.2 36.3 36.9 37 39.2 41.7   
## 1 1 1 1 2 1 1 2 1 4 1 2 1 1   
##   
## $temp.min.cold  
##   
## -31.4 -27.1 -26.7 -26.5 -25.8 -21.2 -20.9 -20.8 -20.7 -15.5 -15.3 -14.2 -14.1   
## 1 1 1 1 1 2 1 1 1 1 1 1 1   
## -13.8 -13.7 -12.2 -11.7 -10.5 -10.2 -9.5 -9.2 -9.1 -9 -7.9 -7.3 -6.6   
## 1 1 1 1 1 2 4 1 1 2 1 2 1   
## -6.5 -5.7 -5.6 -4.8 -4.5 -4.4 -4.1 -3.6 -2.6 -2.4 -2 -1.6 -1.3   
## 1 1 2 1 1 1 1 1 2 2 1 1 1   
## -0.3 0 0.1 0.3 0.4 0.5 0.6 1.5 2.2 2.5 2.6 2.7 2.8   
## 1 1 3 1 1 1 1 1 1 1 3 1 1   
## 2.9 3.1 3.5 3.6 4 4.2 4.4 4.5 4.6 4.8 4.9 5 5.2   
## 1 2 1 3 3 1 1 1 1 2 1 1 1   
## 5.5 5.7 5.8 5.9 6 6.2 6.3 6.4 6.9 7.2 7.3 7.5 7.6   
## 1 2 1 1 1 3 1 2 1 2 2 1 1   
## 7.7 8.4 8.5 8.7 9 10.3 10.7 10.8 11 11.8 12.8 12.9 13   
## 1 1 2 2 1 1 1 1 1 1 1 1 1   
## 14.6 15.1 15.2 15.4 15.5 15.7 16 16.4 16.7 16.8 17.2 17.3 17.4   
## 1 1 1 1 1 1 1 1 1 1 5 1 1   
## 17.8 18.3 18.5 18.7 18.8 19.1 19.6 19.7 19.9 20 20.1 20.3 20.4   
## 2 1 3 1 1 1 1 1 1 1 6 1 4   
## 20.5 20.6 20.7 20.8 20.9 21 21.1 21.6 21.9 22.1 22.2 22.5 23.2   
## 1 1 1 1 2 1 2 1 1 1 2 1 1   
## 23.7 25.2   
## 1 1   
##   
## $temp.ann.range  
##   
## 5.4 6.7 7.4 8.6 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 10 10.1 10.2   
## 1 1 2 1 1 2 2 1 2 1 3 3 1 3 1 1   
## 10.3 10.7 10.9 11.1 11.5 11.7 11.8 11.9 13.1 13.5 14.1 14.2 14.3 14.4 14.5 14.7   
## 3 2 1 2 1 1 1 1 1 2 3 3 1 1 1 1   
## 14.8 15.2 15.4 15.7 15.9 16.1 16.2 16.5 16.6 16.9 17.4 17.5 17.6 18.2 18.6 18.8   
## 1 1 2 1 1 1 1 1 1 1 4 1 1 1 1 2   
## 19.2 19.4 19.5 19.6 19.8 20 20.1 20.2 20.3 20.4 20.5 20.6 21 21.5 21.7 21.8   
## 1 1 1 2 1 1 1 2 1 1 2 1 1 1 1 4   
## 22 22.1 22.8 22.9 23 23.2 23.8 23.9 24 24.2 24.4 24.5 25.1 25.2 25.3 25.4   
## 3 1 2 1 1 1 1 1 2 1 1 1 1 1 1 2   
## 25.7 25.9 26 26.5 26.6 26.7 27 28.3 28.5 28.6 28.7 29 29.1 29.2 30.1 30.2   
## 1 2 1 2 2 2 2 1 1 1 1 1 1 1 1 2   
## 30.6 30.8 31.3 31.5 32 32.3 32.5 32.8 33.2 33.4 33.8 33.9 34.1 34.2 34.5 34.8   
## 1 3 1 1 3 2 1 1 3 3 1 1 1 1 1 1   
## 35.3 35.5 36.5 36.6 37.1 37.2 38.1 41.4 42.1 43.2 44.5 48.1 49.1 52   
## 2 1 1 1 1 1 1 2 1 1 1 1 1 1   
##   
## $temp.mean.wetqr  
##   
## -10.6 -4.9 -4.3 -4.1 -3.7 -1.8 -1.5 -0.8 -0.1 1.2 1.7 1.8 2.9   
## 1 1 1 1 1 1 2 1 1 1 1 1 1   
## 3.4 3.5 3.9 4 4.2 4.9 5.5 6 6.1 6.3 6.5 7.5 7.6   
## 1 2 1 1 1 1 1 1 1 2 3 1 1   
## 8.1 8.3 8.8 9.1 9.3 9.6 9.8 9.9 10.2 10.3 10.5 10.6 10.9   
## 1 1 1 1 1 3 1 1 2 1 2 2 1   
## 11.1 11.3 11.7 12 12.1 12.2 12.3 12.7 13 13.1 13.2 13.3 13.5   
## 2 1 1 1 1 1 1 1 1 2 3 1 2   
## 13.6 13.7 14.7 14.8 15.3 15.5 15.6 15.7 16.3 16.5 17.3 18.2 18.8   
## 1 2 3 1 1 1 1 1 1 1 1 1 1   
## 19.9 20.2 20.6 20.9 21.1 21.2 21.3 21.4 21.6 21.8 22.1 22.5 22.6   
## 1 1 2 1 1 1 2 1 1 1 3 1 1   
## 22.9 23.4 23.5 23.6 23.8 23.9 24.4 24.6 24.8 25.1 25.2 25.3 25.4   
## 1 3 2 1 1 3 1 1 1 2 1 1 3   
## 25.5 25.6 25.7 25.8 25.9 26 26.1 26.2 26.4 26.5 26.6 26.7 26.8   
## 1 4 2 1 2 2 5 3 1 7 6 1 4   
## 27 27.1 27.2 27.5 27.7 27.8 27.9 28.1 28.2 29.5   
## 1 2 4 1 2 1 1 4 1 1   
##   
## $temp.mean.dryqr  
##   
## -16.2 -15 -13.7 -12.1 -10.5 -8.7 -8.6 -7.4 -7.3 -6.8 -6.7 -6.4 -6   
## 1 1 2 1 1 1 1 1 1 1 1 1 1   
## -5.7 -4.2 -3.6 -3.3 -3 -1.8 -1.6 -1.4 -1.3 -0.6 0.1 0.2 0.5   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 1 1.4 2.3 4 4.2 4.6 5.6 6.9 8.2 8.9 9.9 10.2 10.5   
## 1 1 1 1 2 1 1 1 1 1 1 1 1   
## 10.6 11.2 11.4 11.8 12 12.2 12.3 12.4 12.5 12.6 13 13.1 13.4   
## 1 1 1 1 1 2 1 2 1 1 1 3 2   
## 13.6 13.8 14 14.2 14.4 14.6 14.8 15 15.1 15.2 15.6 16.5 16.8   
## 1 1 1 2 1 1 2 1 1 1 2 1 1   
## 17 17.2 17.4 17.5 17.6 17.7 18 18.3 18.4 18.5 18.6 19.3 20   
## 2 1 3 1 1 3 1 1 1 1 1 2 1   
## 20.1 20.2 20.3 20.4 20.5 21 21.4 21.5 21.7 21.8 21.9 22.2 22.3   
## 1 3 1 2 1 1 2 2 1 1 1 2 1   
## 22.6 22.7 22.8 22.9 23 23.1 23.2 23.3 23.4 23.5 23.6 23.8 23.9   
## 1 1 3 2 2 2 7 8 2 2 2 2 3   
## 24 24.7 24.8 25.2 25.3 25.4 25.7 25.8 25.9 26 26.4 26.6 26.8   
## 2 3 2 2 1 1 5 1 1 2 2 2 1   
## 27.2 27.4 27.5   
## 1 1 1   
##   
## $temp.mean.warmqr  
##   
## 1.7 2.3 4.3 5.2 8 8.1 8.9 9.1 9.3 9.6 11 11.1 11.4 12 12.4 12.6   
## 1 1 1 1 2 2 1 1 1 2 1 1 1 1 1 2   
## 12.7 13.1 13.2 13.3 13.6 13.8 14.4 14.5 14.7 14.8 15.2 15.6 15.7 15.8 15.9 16.1   
## 1 2 1 1 1 1 1 1 1 1 1 2 2 1 2 2   
## 16.4 16.5 16.9 17.6 18 18.1 18.3 18.4 18.6 19.3 20.1 20.2 20.3 20.5 20.6 20.7   
## 1 2 1 2 3 1 2 1 1 1 1 2 2 1 1 1   
## 20.9 21.1 21.4 21.5 21.6 21.7 21.8 22 22.1 22.4 22.6 22.9 23.1 23.2 23.4 23.6   
## 2 1 4 1 1 2 1 2 1 2 1 2 2 1 1 1   
## 23.7 23.8 23.9 24.2 24.3 24.5 24.6 24.7 24.9 25.1 25.3 25.4 25.6 25.7 25.9 26   
## 1 2 2 1 1 2 1 1 1 1 2 5 5 3 2 1   
## 26.1 26.3 26.4 26.5 26.6 26.8 27.1 27.2 27.3 27.4 27.5 27.6 27.7 27.9 28 28.1   
## 3 4 6 7 2 3 3 2 3 1 6 3 2 2 1 2   
## 28.4 28.5 29.1 29.2 30 31.9   
## 1 2 1 2 1 1   
##   
## $temp.mean.coldqr  
##   
## -25.5 -21.9 -21.4 -21 -20.7 -16.6 -16.2 -11.1 -10.8 -10.6 -10.1 -9.7 -8.6   
## 1 1 1 1 1 2 1 1 1 1 1 1 2   
## -8.5 -8.1 -7.3 -6.6 -6.3 -6.2 -5.4 -5.1 -5 -4.1 -3.9 -3.8 -3.3   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## -2.8 -2.1 -1.7 -1.4 -1.3 -1.2 -0.8 -0.7 1.7 2.3 2.4 2.6 2.9   
## 1 2 1 1 1 3 1 2 1 2 1 1 1   
## 3.3 3.6 3.7 3.8 4.3 4.5 4.8 5.9 6.5 7.2 7.4 7.5 8.1   
## 1 1 1 2 1 1 1 1 1 1 2 1 1   
## 8.2 8.6 8.8 8.9 9.5 9.6 9.8 10.4 10.5 10.6 10.9 11.2 11.3   
## 2 1 1 2 1 3 1 2 3 1 1 1 1   
## 11.4 11.5 11.7 11.9 12 12.1 12.4 12.5 12.7 12.8 12.9 13.1 13.2   
## 1 2 3 1 1 4 1 1 1 1 1 1 1   
## 13.5 13.6 13.9 14.4 14.5 14.7 15 15.1 15.2 15.6 16.1 16.2 17   
## 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 17.2 17.3 17.4 17.9 18 18.5 19 19.3 19.4 19.7 20 21 21.4   
## 1 1 1 1 1 1 1 1 1 1 2 1 1   
## 21.7 22.2 22.3 22.7 22.8 22.9 23 23.1 23.2 23.3 23.4 23.5 23.6   
## 1 1 1 2 1 1 5 1 4 4 1 1 2   
## 23.7 23.8 23.9 24 24.1 24.3 24.7 24.8 25.1 25.2 25.4 25.5 25.6   
## 1 1 3 1 1 1 2 2 2 1 1 2 2   
## 25.7 25.8 26.5 26.9 27.5   
## 2 1 1 1 1   
##   
## $rain  
##   
## 73 174 208 212 214 216 236 244 252 257 272 276 278 281 290 293   
## 1 1 1 1 2 1 1 1 1 2 1 1 2 1 1 1   
## 296 301 305 310 338 354 355 374 380 384 420 422 436 475 484 500   
## 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 2   
## 501 508 520 526 539 546 564 572 583 597 598 599 603 630 637 656   
## 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1   
## 657 664 682 691 692 703 706 723 762 780 781 788 790 793 803 834   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 859 867 872 882 915 926 964 972 976 977 996 1003 1016 1019 1027 1036   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 1037 1052 1085 1099 1117 1121 1150 1156 1165 1176 1184 1208 1211 1262 1263 1283   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 1307 1313 1315 1327 1379 1387 1397 1418 1427 1476 1505 1545 1555 1649 1661 1663   
## 1 1 1 1 1 1 1 1 2 1 2 1 1 1 1 1   
## 1664 1698 1704 1720 1741 1831 1936 1974 1975 2012 2043 2087 2110 2142 2314 2315   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 2319 2421 2444 2462 2494 2542 2561 2567 2576 2585 2598 2607 2616 2660 2662 2664   
## 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1   
## 2674 2726 2731 2767 2770 2803 2814 2835 2865 2920 2993 3015 3031 3042 3048 3191   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 3269 3273 3283 3329 3612 3991   
## 1 1 2 1 1 1   
##   
## $rain.wetm  
##   
## 12 23 26 27 28 30 31 34 36 37 38 41 43 44 45 46 50 53 54 57   
## 1 2 1 1 2 1 3 1 1 3 1 2 1 1 2 1 1 1 1 4   
## 59 60 61 63 64 66 69 70 71 73 77 78 80 84 85 87 88 92 94 95   
## 1 1 1 1 1 1 1 2 1 1 2 2 1 1 1 1 1 2 1 1   
## 96 101 103 104 105 107 108 110 113 115 116 117 120 121 123 127 129 132 133 137   
## 2 1 1 1 1 1 1 1 1 1 1 4 2 1 1 1 2 1 2 1   
## 139 149 151 154 155 157 159 160 162 175 181 182 184 192 201 204 213 214 215 216   
## 1 2 2 1 1 1 3 3 1 1 1 2 1 1 1 1 1 1 1 1   
## 217 224 235 246 247 251 253 254 255 261 265 270 275 278 287 288 290 299 300 301   
## 1 1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 303 309 315 316 343 345 351 355 356 362 365 368 371 372 375 378 379 381 382 383   
## 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 2 1 1 2   
## 384 386 390 394 397 401 412 416 428 458 459 470 471 472 481 503 506 515 521   
## 1 1 3 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1   
##   
## $rain.drym  
##   
## 0 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17 18 19 20 21   
## 7 5 7 1 2 2 5 3 7 2 6 3 3 2 3 1 2 1 5 1   
## 22 23 24 25 26 27 28 29 30 31 32 33 34 37 41 42 43 44 45 49   
## 1 3 3 1 3 4 4 2 2 1 4 2 3 2 1 1 2 1 1 1   
## 50 52 53 54 56 57 59 62 63 64 65 66 71 72 76 78 81 82 83 84   
## 1 2 1 2 1 1 1 1 4 2 1 1 3 1 1 1 2 1 1 1   
## 88 91 95 96 99 100 102 103 105 108 109 111 112 113 116 117 118 119 126 131   
## 2 1 1 1 2 2 2 4 1 1 1 1 2 4 1 1 1 1 1 1   
## 132 137 144 147 150 160 162 238   
## 1 1 1 1 1 1 1 1   
##   
## $rain.seas  
##   
## 10 11 12 13 14 15 16 17 18 19 20 22 23 24 25 26 27 28 29 30   
## 1 1 3 2 2 3 3 2 3 1 3 2 5 1 3 3 2 4 7 5   
## 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 49 50 51   
## 3 1 3 5 5 1 4 2 3 4 4 6 3 4 6 3 3 2 1 3   
## 56 57 59 60 61 62 63 65 66 68 69 71 73 74 78 82 83 84 85 86   
## 3 3 2 3 2 1 1 2 4 2 1 2 1 1 1 1 3 2 1 3   
## 87 88 89 93 100 101 104 106 110 113 115 118   
## 1 1 1 1 1 2 2 3 1 1 1 2   
##   
## $rain.wetqr  
##   
## 31 65 73 76 77 83 84 92 97 106 109 116 121 122 127 129   
## 1 2 1 1 2 1 1 3 1 2 2 1 3 1 2 1   
## 143 144 148 152 157 166 168 171 172 176 186 189 197 216 217 218   
## 1 1 1 2 1 1 1 1 2 2 1 1 2 1 1 1   
## 220 221 225 253 256 258 259 260 265 267 271 272 275 287 289 292   
## 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 299 308 311 313 321 322 325 328 332 333 338 339 347 355 358 372   
## 1 1 2 3 1 1 2 1 1 1 2 1 2 1 1 1   
## 382 408 409 414 426 432 438 443 446 450 451 455 458 468 469 472   
## 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1   
## 506 530 546 556 566 582 600 601 603 616 650 668 674 692 704 710   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1   
## 719 721 724 735 753 759 767 778 790 803 806 836 853 870 885 900   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 943 970 989 994 1003 1004 1006 1007 1008 1009 1011 1012 1017 1023 1025 1026   
## 1 2 1 1 3 1 1 1 1 1 2 2 1 1 1 2   
## 1027 1031 1032 1050 1055 1091 1110 1117 1125 1136 1177 1245 1248 1278 1281 1294   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 1308 1310 1312 1313 1422   
## 1 1 1 1 1   
##   
## $rain.dryqr  
##   
## 0 4 5 7 9 10 11 12 16 20 22 24 25 27 28 29 31 33 34 35   
## 5 1 1 2 4 1 1 2 1 1 1 1 1 2 2 2 1 6 1 2   
## 36 40 44 48 49 50 52 54 55 59 62 64 65 67 68 71 73 75 77 81   
## 3 5 1 2 2 1 1 1 1 1 1 1 1 3 2 1 1 1 1 2   
## 84 85 90 92 95 97 98 99 100 102 104 105 106 111 112 117 125 132 133 137   
## 1 1 3 3 1 1 1 1 1 1 2 1 6 1 1 1 1 3 2 1   
## 138 139 143 150 162 163 165 176 177 186 195 196 198 200 201 204 205 208 212 213   
## 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1 1 1 1   
## 217 220 240 244 249 252 256 257 259 280 284 288 294 298 304 305 324 325 327 331   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 1 1 1   
## 335 336 339 340 345 349 350 352 359 365 372 374 379 380 381 383 385 388 389 391   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1   
## 413 414 436 468 495 502 512 521 581 761   
## 1 1 1 1 1 1 1 1 1 1   
##   
## $rain.warmqr  
##   
## 0 2 10 11 13 19 25 30 32 33 37 38 39 48 50 51   
## 2 1 1 1 3 1 1 1 1 1 2 1 1 2 2 1   
## 54 57 60 61 71 75 77 84 87 89 93 98 100 102 106 109   
## 2 1 2 1 1 2 1 2 1 1 1 1 1 1 3 2   
## 117 120 121 122 123 134 142 144 150 157 158 160 162 168 176 184   
## 1 2 2 1 1 2 1 2 1 1 1 1 2 1 1 1   
## 185 188 191 197 200 202 205 209 213 218 222 256 258 262 266 268   
## 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 2   
## 271 280 285 287 296 299 309 310 319 325 326 328 337 344 352 358   
## 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1   
## 371 375 382 383 385 388 391 392 394 397 403 407 408 415 428 439   
## 1 1 1 2 2 1 1 1 1 1 1 1 2 1 1 1   
## 451 453 458 463 472 486 501 506 515 524 537 600 616 626 631 650   
## 1 1 1 1 2 2 1 1 1 1 1 1 1 1 1 1   
## 659 680 689 706 724 741 834 837 855 868 881 885 891 925 928 969   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 989 994 1001 1003 1004 1005 1007 1008 1009 1011 1012 1013 1019 1023 1027 1031   
## 1 1 2 3 2 1 1 1 1 2 2 1 1 1 1 1   
## 1110 1136   
## 1 1   
##   
## $rain.coldqr  
##   
## 0 7 10 12 13 20 29 30 34 38 41 42 43 44 45 46   
## 2 2 1 1 1 1 1 1 1 1 1 3 1 1 2 2   
## 47 49 52 54 55 57 63 68 71 73 77 79 80 84 85 89   
## 2 1 1 1 3 1 1 3 1 2 1 1 1 1 1 1   
## 90 95 97 98 104 105 106 108 111 112 114 116 120 122 123 126   
## 1 1 2 1 2 1 1 2 1 1 1 2 1 2 1 1   
## 127 128 129 133 134 135 137 144 155 162 165 166 171 172 176 184   
## 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1   
## 186 193 195 196 204 212 213 239 253 256 259 265 266 267 270 272   
## 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1   
## 275 277 279 280 283 284 287 288 292 296 297 298 304 311 313 322   
## 1 1 1 1 1 1 1 1 1 1 1 2 1 2 1 1   
## 324 325 326 328 333 335 339 345 349 350 359 371 374 381 383 384   
## 1 2 1 1 1 1 1 1 2 2 1 2 1 2 2 1   
## 391 393 397 398 399 400 405 408 413 426 431 438 443 459 469 483   
## 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 489 495 504 523 542 560 566 580 633 642 652 670 705 718 838 848   
## 1 2 1 1 1 1 1 2 1 2 1 1 1 1 1 1   
## 975 1054 1206 1214   
## 1 1 1 1   
##   
## $LAI  
##   
## 0.51 1.01 1.24 1.26 1.29 1.32 1.46 1.51 1.67 1.76 1.89 1.93 1.99 2.01 2.07 2.14   
## 1 10 2 8 2 2 1 10 2 2 1 1 1 1 4 6   
## 2.15 2.17 2.24 2.26 2.42 2.51 2.6 2.71 2.76 2.79 2.82 2.96 3.07 3.14 3.26 3.35   
## 1 1 2 4 2 6 2 1 3 3 2 2 2 2 7 4   
## 3.39 3.46 3.48 3.57 4.03 4.04 4.07 4.14 4.26 4.5 4.51 6.99 NA   
## 1 1 1 2 2 5 6 7 17 9 22 1 6   
##   
## $NPP  
##   
## 1012 1023 1044 1102 1106 1119 1127 1131 1180 1209 121 1225 1266 1272 1274 1325   
## 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1   
## 1335 1405 1414 1415 1435 1461 1475 1552 1563 1648 1692 1761 1795 1800 1809 1857   
## 1 1 1 1 3 1 4 1 1 1 1 1 3 9 1 1   
## 1864 1886 1896 192 204 2132 2146 223 2246 2270 2296 2337 255 261 279 30   
## 8 3 1 1 1 1 2 3 1 2 1 1 1 1 1 3   
## 305 317 32 339 349 359 363 386 4 404 41 411 414 415 45 464   
## 2 1 1 2 1 1 1 1 2 2 1 1 1 1 1 1   
## 474 476 477 478 490 492 502 505 517 522 525 533 536 557 572 575   
## 1 1 2 2 1 1 1 1 1 1 3 1 1 1 2 1   
## 579 595 596 605 61 615 633 643 65 652 661 684 690 691 695 698   
## 1 1 1 2 2 1 1 2 2 1 1 1 1 1 1 1   
## 708 711 733 743 75 751 756 773 793 811 825 826 827 844 855 907   
## 1 1 1 1 2 1 2 2 1 1 2 1 1 1 1 1   
## 908 932 933 956 969 972 991 NA   
## 2 1 1 3 1 1 2 6   
##   
## $hemisphere  
##   
## -1 1   
## 96 82

### Abans de continuar anem a canviar els charters NA per NA's   
df.plantes[df.plantes=="NA"]<-NA  
any(is.na(df.plantes)) # Hi han valors perduts?

## [1] TRUE

### Encara que growthform tingui que ser factor no puc passar-la perque  
### després la necessite sense ser-ho i el mateix passa amb hemisphere  
  
df.plantes$entered.by<-as.factor(df.plantes$entered.by)  
df.plantes$LAI<-as.numeric(df.plantes$LAI)  
df.plantes$NPP<-as.numeric(df.plantes$NPP)  
  
sapply(df.plantes,class) # es confirmen els canvis

## sort\_number site Genus\_species Family   
## "numeric" "numeric" "character" "character"   
## growthform height loght Country   
## "character" "numeric" "numeric" "character"   
## Site lat long entered.by   
## "character" "numeric" "numeric" "factor"   
## alt temp diurn.temp isotherm   
## "numeric" "numeric" "numeric" "numeric"   
## temp.seas temp.max.warm temp.min.cold temp.ann.range   
## "numeric" "numeric" "numeric" "numeric"   
## temp.mean.wetqr temp.mean.dryqr temp.mean.warmqr temp.mean.coldqr   
## "numeric" "numeric" "numeric" "numeric"   
## rain rain.wetm rain.drym rain.seas   
## "numeric" "numeric" "numeric" "numeric"   
## rain.wetqr rain.dryqr rain.warmqr rain.coldqr   
## "numeric" "numeric" "numeric" "numeric"   
## LAI NPP hemisphere   
## "numeric" "numeric" "numeric"

## (b)  
rownames(df.plantes)<-paste(df.plantes$site,df.plantes$Family,sep="\_")  
df.plantes[1:3,] # confirma l'assignació

## sort\_number site Genus\_species Family growthform  
## 193\_Sapindaceae 1402 193 Acer\_macryophyllum Sapindaceae Tree  
## 103\_Malvaceae 25246 103 Quararibea\_cordata Malvaceae Tree  
## 54\_Poaceae 11648 54 Eragrostis\_dielsii Poaceae Herb  
## height loght Country Site lat long  
## 193\_Sapindaceae 28.0 1.4471580 USA Oregon - McDun 44.600 -123.334  
## 103\_Malvaceae 26.6 1.4248816 Peru Manu 12.183 -70.550  
## 54\_Poaceae 0.3 -0.5228787 Australia Central Australia 23.800 133.833  
## entered.by alt temp diurn.temp isotherm temp.seas temp.max.warm  
## 193\_Sapindaceae Angela 179 10.8 11.8 4.4 5.2 27.0  
## 103\_Malvaceae Angela 386 24.5 10.8 7.4 0.9 31.2  
## 54\_Poaceae Michelle 553 20.9 16.3 4.8 6.0 37.0  
## temp.min.cold temp.ann.range temp.mean.wetqr temp.mean.dryqr  
## 193\_Sapindaceae 0.3 26.7 4.9 17.4  
## 103\_Malvaceae 16.7 14.5 25.1 23.2  
## 54\_Poaceae 3.6 33.4 28.1 14.8  
## temp.mean.warmqr temp.mean.coldqr rain rain.wetm rain.drym  
## 193\_Sapindaceae 17.6 4.5 1208 217 13  
## 103\_Malvaceae 25.3 23.1 3015 416 99  
## 54\_Poaceae 28.1 12.8 278 37 9  
## rain.seas rain.wetqr rain.dryqr rain.warmqr rain.coldqr LAI  
## 193\_Sapindaceae 69 601 68 75 560 2.51  
## 103\_Malvaceae 45 1177 340 928 359 4.26  
## 54\_Poaceae 42 109 35 109 42 1.32  
## NPP hemisphere  
## 193\_Sapindaceae 572 1  
## 103\_Malvaceae 1405 -1  
## 54\_Poaceae 756 -1

## (c)  
df.plantes<-df.plantes[apply(df.plantes,1, function(x) sum(is.na(x)))<=6,]  
  
## (d)  
df.plantes<-df.plantes[,apply(df.plantes,2, function(x) sum(is.na(x)))<=15]  
  
## (e)  
  
### Quants valors perduts té la variable growthform?  
sum(is.na(df.plantes$growthform))

## [1] 10

table(df.plantes$growthform, useNA="always")

##   
## Fern Herb Herb/Shrub Shrub Shrub/Tree Tree <NA>   
## 1 44 1 49 12 61 10

var.estudi<-names(table(df.plantes$growthform, useNA="always"))[table(df.plantes$growthform, useNA="always")>2]  
var.estudi<-var.estudi[!is.na(var.estudi)]  
  
df.grwNA<-subset(df.plantes, is.na(df.plantes$growthform), select = c(growthform, height)); df.grwNA

## growthform height  
## 113\_Phyllanthaceae <NA> 14.80  
## 34\_Asteraceae <NA> 0.50  
## 104\_Lecythidaceae <NA> 10.00  
## 60\_Malvaceae <NA> 15.00  
## 130\_Melastomataceae <NA> 0.80  
## 102\_NA <NA> 2.50  
## 25\_Bruniaceae <NA> 3.00  
## 88\_Fabaceae - C <NA> 3.80  
## 172\_Polemoniaceae <NA> 0.81  
## 177\_Euphorbiaceae <NA> 1.00

df.singrNA<-subset(df.plantes, !is.na(df.plantes$growthform) & df.plantes$growthform%in%var.estudi, select = c(growthform, height)); head(df.singrNA)

## growthform height  
## 193\_Sapindaceae Tree 28.0  
## 103\_Malvaceae Tree 26.6  
## 54\_Poaceae Herb 0.3  
## 144\_Cistaceae Shrub 1.6  
## 178\_Polemoniaceae Herb 0.2  
## 59\_Salicaceae Shrub 1.7

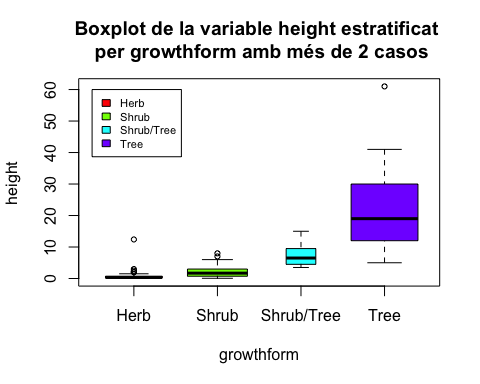
unique(df.singrNA$growthform) # Es comprova que no té els que només presenten 1 o 2 casos com "Fern"

## [1] "Tree" "Herb" "Shrub" "Shrub/Tree"

attach(df.singrNA)  
by(height,growthform,function(x) list(mean=mean(x),sd=sd(x),median=median(x),quantile=quantile(x)))

## growthform: Herb  
## $mean  
## [1] 0.8892545  
##   
## $sd  
## [1] 1.907728  
##   
## $median  
## [1] 0.325  
##   
## $quantile  
## 0% 25% 50% 75% 100%   
## 0.03220 0.20000 0.32500 0.71775 12.40000   
##   
## ------------------------------------------------------------   
## growthform: Shrub  
## $mean  
## [1] 2.324345  
##   
## $sd  
## [1] 1.907467  
##   
## $median  
## [1] 1.7  
##   
## $quantile  
## 0% 25% 50% 75% 100%   
## 0.07 0.72 1.70 3.00 8.00   
##   
## ------------------------------------------------------------   
## growthform: Shrub/Tree  
## $mean  
## [1] 7.375  
##   
## $sd  
## [1] 3.52346  
##   
## $median  
## [1] 6.5  
##   
## $quantile  
## 0% 25% 50% 75% 100%   
## 3.50 4.75 6.50 9.25 15.00   
##   
## ------------------------------------------------------------   
## growthform: Tree  
## $mean  
## [1] 21.12738  
##   
## $sd  
## [1] 11.23814  
##   
## $median  
## [1] 19  
##   
## $quantile  
## 0% 25% 50% 75% 100%   
## 5 12 19 30 61

boxplot(height~growthform, col=rainbow(4), varwidth=TRUE, main="Boxplot de la variable height estratificat \n per growthform amb més de 2 casos", cex=0.7)  
legend(0.5,60,legend=var.estudi,cex=0.7, fill = rainbow(4))



detach(df.singrNA)  
  
### En vista de la informació obtinguda és clasificaran per growthform en funció  
### de si estan dins de les caixes (i.e, si les altures dels NA's estàn entre el   
### primer i tercer quartil)  
  
for(i in 1:nrow(df.grwNA)){  
 if(df.grwNA$height[i]<0.72){df.grwNA$growthform[i]<-"Herb"; next}  
 if(df.grwNA$height[i]<4){df.grwNA$growthform[i]<-"Shrub"; next}  
 if(df.grwNA$height[i]<11){df.grwNA$growthform[i]<-"Shrub/Tree"; next}  
 else {df.grwNA$growthform[i]<-"Tree"}  
}  
df.grwNA

## growthform height  
## 113\_Phyllanthaceae Tree 14.80  
## 34\_Asteraceae Herb 0.50  
## 104\_Lecythidaceae Shrub/Tree 10.00  
## 60\_Malvaceae Tree 15.00  
## 130\_Melastomataceae Shrub 0.80  
## 102\_NA Shrub 2.50  
## 25\_Bruniaceae Shrub 3.00  
## 88\_Fabaceae - C Shrub 3.80  
## 172\_Polemoniaceae Shrub 0.81  
## 177\_Euphorbiaceae Shrub 1.00

df.plantes$growthform[is.na(df.plantes$growthform)]<-df.grwNA$growthform  
df.plantes["130\_Melastomataceae","growthform"] # Es corfirma que els casos s'han assignat de la manera correcta

## [1] "Shrub"

## (f)  
  
### Quants valors perduts té la variable LAI?  
sum(is.na(df.plantes$LAI))

## [1] 6

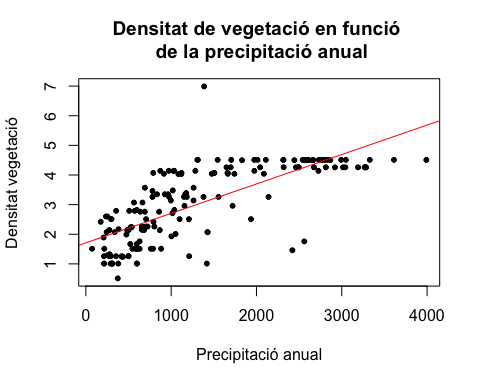
df.laiNA<-subset(df.plantes, is.na(df.plantes$LAI), select=c(LAI, rain)); df.laiNA

## LAI rain  
## 118\_Rhizophoraceae NA 2585  
## 123\_Lamiaceae NA 3031  
## 139\_Moraceae NA 1315  
## 180\_Pinaceae NA 1327  
## 60\_Malvaceae NA 1397  
## 198\_Ericaceae NA 977

df.sinlaiNA<-subset(df.plantes, !is.na(df.plantes$LAI), select=c(LAI, rain)); head(df.sinlaiNA)

## LAI rain  
## 193\_Sapindaceae 2.51 1208  
## 103\_Malvaceae 4.26 3015  
## 54\_Poaceae 1.32 278  
## 144\_Cistaceae 1.01 598  
## 178\_Polemoniaceae 3.26 976  
## 59\_Salicaceae 6.99 1387

attach(df.sinlaiNA) # utilitzem un data.frame sense els NA's de LAI  
plot(LAI~rain, pch=20, main="Densitat de vegetació en funció \n de la precipitació anual",   
 xlab="Precipitació anual", ylab="Densitat vegetació")  
abline(lm(LAI~rain), col="red")



model.densitat<-lm(LAI~rain)  
summary(model.densitat) # r^2=0.557 relació lineal positiva moderada

##   
## Call:  
## lm(formula = LAI ~ rain)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -2.6565 -0.6702 0.0484 0.5450 3.9006   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.712e+00 1.112e-01 15.40 <2e-16 \*\*\*  
## rain 9.933e-04 6.794e-05 14.62 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.8507 on 170 degrees of freedom  
## Multiple R-squared: 0.557, Adjusted R-squared: 0.5544   
## F-statistic: 213.8 on 1 and 170 DF, p-value: < 2.2e-16

coef<-model.densitat$coefficients; coef

## (Intercept) rain   
## 1.7117756518 0.0009932623

den<-function(x){  
 return(coef[1]+coef[2]\*x)  
}  
  
detach(df.sinlaiNA)  
  
df.laiNA$LAI<-den(df.laiNA$rain); df.laiNA

## LAI rain  
## 118\_Rhizophoraceae 4.279359 2585  
## 123\_Lamiaceae 4.722354 3031  
## 139\_Moraceae 3.017916 1315  
## 180\_Pinaceae 3.029835 1327  
## 60\_Malvaceae 3.099363 1397  
## 198\_Ericaceae 2.682193 977

df.plantes$LAI[is.na(df.plantes$LAI)]<-df.laiNA$LAI  
df.plantes["180\_Pinaceae","LAI"] # Comprovació

## [1] 3.029835

## (g)  
  
### Quants valors perduts té la variable LAI?  
sum(is.na(df.plantes$NPP))

## [1] 6

df.nppNA<-subset(df.plantes, is.na(df.plantes$NPP), select=c(NPP, rain)); df.nppNA

## NPP rain  
## 118\_Rhizophoraceae NA 2585  
## 123\_Lamiaceae NA 3031  
## 139\_Moraceae NA 1315  
## 180\_Pinaceae NA 1327  
## 60\_Malvaceae NA 1397  
## 198\_Ericaceae NA 977

df.sinppNA<-subset(df.plantes, !is.na(df.plantes$NPP), select=c(NPP, rain)); head(df.sinppNA)

## NPP rain  
## 193\_Sapindaceae 572 1208  
## 103\_Malvaceae 1405 3015  
## 54\_Poaceae 756 278  
## 144\_Cistaceae 359 598  
## 178\_Polemoniaceae 1131 976  
## 59\_Salicaceae 1552 1387

attach(df.sinppNA)   
  
plot(NPP~rain, pch=20, main="Grau acum. de CO2 en funció \n de la precipitació anual", xlab="Precipitació anual", ylab="Grau acum. CO2")  
abline(lm(NPP~rain), col="red")  
  
model.co2<-lm(NPP~rain)  
summary(model.co2) # r^2=0.6208 relació lineal positiva moderada

##   
## Call:  
## lm(formula = NPP ~ rain)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1477.71 -220.61 10.14 213.03 1146.81   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 270.97724 50.55436 5.36 2.68e-07 \*\*\*  
## rain 0.51538 0.03089 16.68 < 2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 386.8 on 170 degrees of freedom  
## Multiple R-squared: 0.6208, Adjusted R-squared: 0.6186   
## F-statistic: 278.4 on 1 and 170 DF, p-value: < 2.2e-16

coef2<-model.co2$coefficients; coef2

## (Intercept) rain   
## 270.9772393 0.5153807

fco2<-function(x){  
 return(coef2[1]+coef2[2]\*x)  
}  
  
detach(df.sinppNA)  
  
df.nppNA$NPP<-fco2(df.nppNA$rain); df.nppNA

## NPP rain  
## 118\_Rhizophoraceae 1603.2364 2585  
## 123\_Lamiaceae 1833.0962 3031  
## 139\_Moraceae 948.7029 1315  
## 180\_Pinaceae 954.8874 1327  
## 60\_Malvaceae 990.9641 1397  
## 198\_Ericaceae 774.5042 977

df.plantes$NPP[is.na(df.plantes$NPP)]<-df.nppNA$NPP  
df.plantes["180\_Pinaceae","NPP"] # Comprovació

## [1] 954.8874

## (h)  
  
### Abans de que es perdin els signe de nort i sud es crearà una nova   
### variable que puga facilitar les operacions en l'apartat següent  
  
df.plantes$tropic<-df.plantes$lat\*df.plantes$hemisphere  
df.plantes$hemisphere<- factor(df.plantes$hemisphere, levels=c(-1,1), labels=c("South","North"))  
head(df.plantes["hemisphere"])

## hemisphere  
## 193\_Sapindaceae North  
## 103\_Malvaceae South  
## 54\_Poaceae South  
## 144\_Cistaceae North  
## 178\_Polemoniaceae North  
## 59\_Salicaceae South

## (i)  
  
attach(df.plantes)  
df.plantes$tropic<-cut(tropic, breaks=c(min(tropic),-23.27,23.27,max(tropic)), labels = c("Capricorn","Tropical","Cancer"), include.lowest=T)  
detach(df.plantes)  
head(df.plantes["tropic"])

## tropic  
## 193\_Sapindaceae Cancer  
## 103\_Malvaceae Tropical  
## 54\_Poaceae Capricorn  
## 144\_Cistaceae Cancer  
## 178\_Polemoniaceae Cancer  
## 59\_Salicaceae Tropical

# Pas(4): Anàlisi  
df.plantes$logheight<-log(df.plantes$height) # es necessitarà més avant  
df.plantsi<-subset(df.plantes, select = c(height,logheight,growthform,LAI,rain,temp,hemisphere,  
 diurn.temp,NPP,tropic))  
head(df.plantsi)

## height logheight growthform LAI rain temp hemisphere  
## 193\_Sapindaceae 28.0 3.3322045 Tree 2.51 1208 10.8 North  
## 103\_Malvaceae 26.6 3.2809112 Tree 4.26 3015 24.5 South  
## 54\_Poaceae 0.3 -1.2039728 Herb 1.32 278 20.9 South  
## 144\_Cistaceae 1.6 0.4700036 Shrub 1.01 598 19.9 North  
## 178\_Polemoniaceae 0.2 -1.6094379 Herb 3.26 976 9.7 North  
## 59\_Salicaceae 1.7 0.5306283 Shrub 6.99 1387 22.6 South  
## diurn.temp NPP tropic  
## 193\_Sapindaceae 11.8 572 Cancer  
## 103\_Malvaceae 10.8 1405 Tropical  
## 54\_Poaceae 16.3 756 Capricorn  
## 144\_Cistaceae 9.7 359 Cancer  
## 178\_Polemoniaceae 10.7 1131 Cancer  
## 59\_Salicaceae 7.4 1552 Tropical

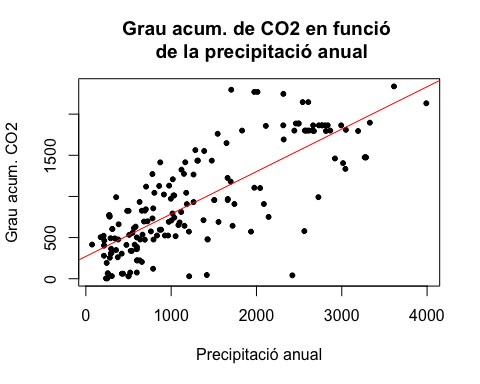
## (a)  
  
### Les variables escollides són:  
names(df.plantsi)

## [1] "height" "logheight" "growthform" "LAI" "rain"   
## [6] "temp" "hemisphere" "diurn.temp" "NPP" "tropic"

### De quin tipus són?  
sapply(df.plantsi,class)

## height logheight growthform LAI rain temp   
## "numeric" "numeric" "character" "numeric" "numeric" "numeric"   
## hemisphere diurn.temp NPP tropic   
## "factor" "numeric" "numeric" "factor"

### Estudi univariant:  
  
library(psych)



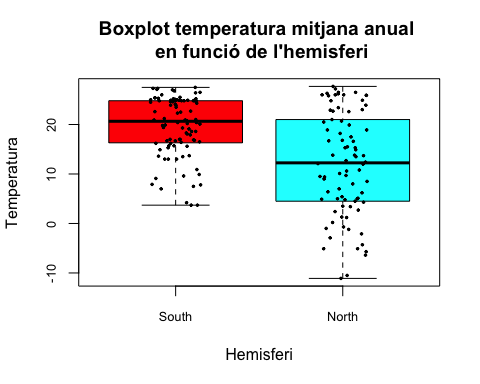
describe(df.plantsi[!(names(df.plantsi)%in%c("growthform","hemisphere","tropic"))]) # per a vars numèriques

## vars n mean sd median trimmed mad min max  
## height 1 178 8.91 11.32 3.25 6.83 4.51 0.03 61.00  
## logheight 2 178 1.06 1.81 1.18 1.16 2.26 -3.44 4.11  
## LAI 3 178 3.05 1.26 3.12 3.09 1.69 0.51 6.99  
## rain 4 178 1344.14 954.79 1044.50 1260.56 915.51 73.00 3991.00  
## temp 5 178 16.13 9.20 18.00 17.11 10.08 -11.10 27.70  
## diurn.temp 6 178 9.91 3.14 9.75 9.66 3.93 4.60 17.90  
## NPP 7 178 963.72 621.16 825.50 942.29 638.26 4.00 2337.00  
## range skew kurtosis se  
## height 60.97 1.61 2.37 0.85  
## logheight 7.55 -0.41 -0.79 0.14  
## LAI 6.48 -0.09 -1.01 0.09  
## rain 3918.00 0.69 -0.72 71.56  
## temp 38.80 -0.81 -0.16 0.69  
## diurn.temp 13.30 0.50 -0.49 0.24  
## NPP 2333.00 0.41 -0.94 46.56

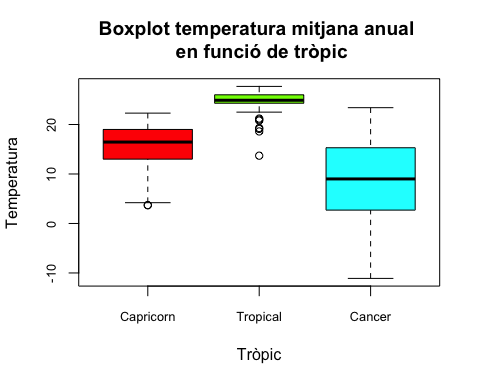
sapply(df.plantsi[c("growthform","hemisphere","tropic")], table, useNA="always") # ver a factors

## $growthform  
##   
## Fern Herb Herb/Shrub Shrub Shrub/Tree Tree <NA>   
## 1 45 1 55 13 63 0   
##   
## $hemisphere  
##   
## South North <NA>   
## 96 82 0   
##   
## $tropic  
##   
## Capricorn Tropical Cancer <NA>   
## 48 65 65 0

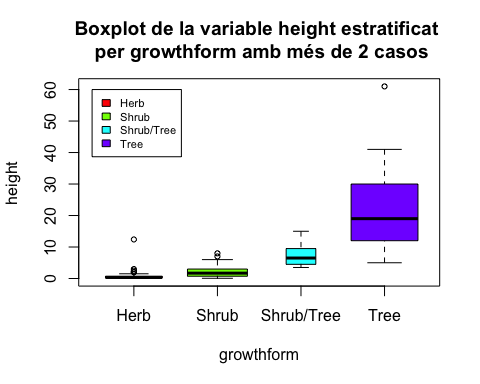
## (b)  
  
boxplot(df.plantsi$temp~df.plantsi$hemisphere,col=rainbow(4)[c(1,3)],xlab="Hemisferi",ylab="Temperatura",cex.axis=0.8,   
 main="Boxplot temperatura mitjana anual \n en funció de l'hemisferi")  
frequencies<-as.vector(table(df.plantsi$hemisphere))   
desvia1<-jitter(rep(1,frequencies[1]),amount=0.15)   
points(desvia1,df.plantsi$temp[df.plantsi$hemisphere=="South"],cex=0.5,pch=20)   
desvia2<-jitter(rep(2,frequencies[2]),amount=0.15)   
points(desvia2,df.plantsi$temp[df.plantsi$hemisphere=="North"],cex=0.5,pch=20)



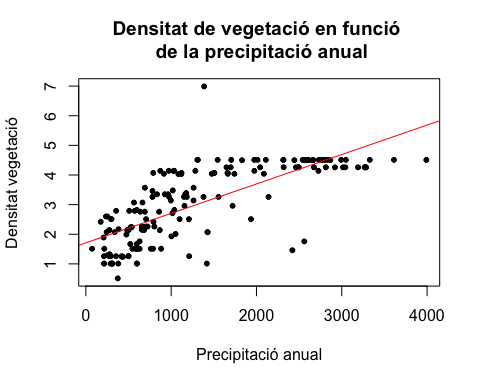
#### S' observa de les gràfiques que, en general, les temperatures en l'hemisferi sud  
#### són molt meés altes que en el Nord. Això s'observa en que el registre de temperatura  
#### més baixa del sud és superior al 25% de registres del nord. A més, el 50% aprox. dels  
#### registres de temperatures a l'hemisferi sud són superior al 75% de les del nord.  
  
boxplot(df.plantsi$temp~df.plantsi$tropic,col=rainbow(4)[1:3],xlab="Tròpic",ylab="Temperatura",cex.axis=0.8,   
 main="Boxplot temperatura mitjana anual \n en funció de tròpic")



#### Clarament, del gràfic s'interpretar que sense dubte la zona més calida és  
#### la Tropical (les seues temperatures són superiors al 100% de les temperatures  
#### de les altres dos zones i la més freda és Cancer)  
  
## (c)  
  
attach(df.singrNA)  
boxplot(height~growthform, col=rainbow(4), varwidth=TRUE, main="Boxplot de la variable height estratificat \n per growthform amb més de 2 casos", cex=0.7)  
legend(0.5,60,legend=var.estudi,cex=0.7, fill = rainbow(4))



detach(df.singrNA)  
  
#### En l'apartat (e) anterior, s'han classificat les plantes amb growthform NA segons la altura   
#### que presentaven i tenin en compte les altures dels altres growthforms.   
#### Aquesta classificació no és una mala estimació, ja que suposant que aquestes plantes  
#### que presenten NA's no formen part dels 50% percent dels extrems (es a dir segueixen al mitja)   
#### la estimació no és del tot incorrecta. Però mai serà correcta. Si es suposa que aquestes plantes   
#### es comporte com la mitjana de les plantes de la classificació de growthform, aleshores   
#### la classificació donada és més que correcta. Encara que aquesta informació ignora certes variables   
#### que hagueren ajudat a afinar les estimaciones com, per exemple, la quantitat de plutja que soperten  
#### la zona on es troben, les temperatures (major temperatures menor creixement, més o menys), la seua NPP,  
#### entre altres.  
  
## (d)  
  
attach(df.sinlaiNA) # utilitzem un data.frame sense els NA's de LAI  
plot(LAI~rain, pch=20, main="Densitat de vegetació en funció \n de la precipitació anual",   
 xlab="Precipitació anual", ylab="Densitat vegetació")  
abline(lm(LAI~rain), col="red")



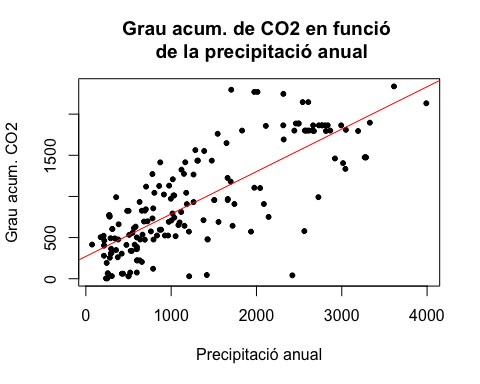
model.densitat<-lm(LAI~rain)  
summary(model.densitat) # r^2=0.557 relació lineal positiva moderada

##   
## Call:  
## lm(formula = LAI ~ rain)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -2.6565 -0.6702 0.0484 0.5450 3.9006   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.712e+00 1.112e-01 15.40 <2e-16 \*\*\*  
## rain 9.933e-04 6.794e-05 14.62 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.8507 on 170 degrees of freedom  
## Multiple R-squared: 0.557, Adjusted R-squared: 0.5544   
## F-statistic: 213.8 on 1 and 170 DF, p-value: < 2.2e-16

coef<-model.densitat$coefficients; coef

## (Intercept) rain   
## 1.7117756518 0.0009932623

den<-function(x){  
 return(coef[1]+coef[2]\*x)  
}  
detach(df.sinlaiNA)  
  
attach(df.sinppNA)   
plot(NPP~rain, pch=20, main="Grau acum. de CO2 en funció \n de la precipitació anual",   
 xlab="Precipitació anual", ylab="Grau acum. CO2")  
abline(lm(NPP~rain), col="red")



model.co2<-lm(NPP~rain)  
summary(model.co2) # r^2=0.6208 relació lineal positiva moderada

##   
## Call:  
## lm(formula = NPP ~ rain)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1477.71 -220.61 10.14 213.03 1146.81   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 270.97724 50.55436 5.36 2.68e-07 \*\*\*  
## rain 0.51538 0.03089 16.68 < 2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 386.8 on 170 degrees of freedom  
## Multiple R-squared: 0.6208, Adjusted R-squared: 0.6186   
## F-statistic: 278.4 on 1 and 170 DF, p-value: < 2.2e-16

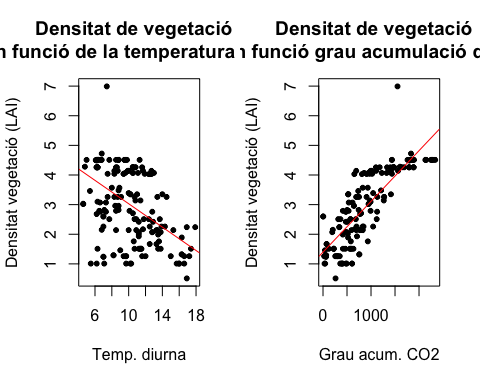
coef2<-model.co2$coefficients; coef2

## (Intercept) rain   
## 270.9772393 0.5153807

fco2<-function(x){  
 return(coef2[1]+coef2[2]\*x)  
}  
detach(df.sinppNA)  
  
#### En els dos casos, les aproximaciones es fan per ajust de mínims quadrats a una recta  
#### i observant el coeficient de regressió al quadrat en els dos casos, els ajust presenten  
#### una relació lienal moderada. Per tant, una estimació dels valors de LAI i NPP en funció  
#### de la precipitació anual soportada per la planta és una bona estimació encara que no  
#### del tot correcta però es una estimació que fa minim els errors respecte dels dades sense NA's  
  
## (e)  
estudivarsnum<-function(x){  
 quartils<-quantile(x, na.rm=T)  
 minim<-quartils[1]  
 maxim<-quartils[5]  
 q1<-quartils[2]  
 Md<-quartils[3]  
 q3<-quartils[4]  
 rang<-max(x)-min(x)  
 R.I<- q3-q1  
 mitjana<-mean(x)  
 desv<-sqrt(mean((x-mean(x))^2))  
 desv.med<-mean(abs(x-median(x)))  
 CV<-desv/mitjana  
 alpha.sim<-((q3-Md)-(Md-q1))/R.I  
 mu4<-mean((x-mean(x))^4)  
 Kurtosis<-mu4/desv^4  
 llista<-list(min=minim,Q1=q1,mediana=Md,mitjana=mitjana,  
 Q3=q3,max=maxim,rang=rang,R.I=R.I,desv=desv,desv.med=desv.med,  
 CV=CV,alpha=alpha.sim,curtosi=Kurtosis)  
 lapply(llista,round,2)  
}  
  
estudiconj<-function(x){  
 list(Estudi\_univariant=t(sapply(x, estudivarsnum)),Covaciancia=cov(x), Correlacio=cor(x), Correlacio2=cor(x)^2)  
}  
  
estudiconj(df.plantes[,c("LAI","diurn.temp","NPP")])

## $Estudi\_univariant  
## min Q1 mediana mitjana Q3 max rang R.I desv desv.med  
## LAI 0.51 2.07 3.12 3.05 4.26 6.99 6.48 2.19 1.26 1.11   
## diurn.temp 4.6 7 9.75 9.91 11.7 17.9 13.3 4.7 3.13 2.57   
## NPP 4 490.5 825.5 963.72 1471.5 2337 2333 981 619.41 514.3   
## CV alpha curtosi  
## LAI 0.41 0.04 2.01   
## diurn.temp 0.32 -0.17 2.53   
## NPP 0.64 0.32 2.08   
##   
## $Covaciancia  
## LAI diurn.temp NPP  
## LAI 1.594442 -1.948258 660.6522  
## diurn.temp -1.948258 9.877274 -767.7566  
## NPP 660.652173 -767.756560 385838.8657  
##   
## $Correlacio  
## LAI diurn.temp NPP  
## LAI 1.0000000 -0.4909345 0.8422976  
## diurn.temp -0.4909345 1.0000000 -0.3932801  
## NPP 0.8422976 -0.3932801 1.0000000  
##   
## $Correlacio2  
## LAI diurn.temp NPP  
## LAI 1.0000000 0.2410167 0.7094652  
## diurn.temp 0.2410167 1.0000000 0.1546693  
## NPP 0.7094652 0.1546693 1.0000000

attach(df.plantsi)  
layout(matrix(c(1,2),nrow=1))  
plot(LAI~diurn.temp, pch=20, xlab="Temp. diurna", ylab="Densitat vegetació (LAI)",  
 main="Densitat de vegetació \n en funció de la temperatura diurna")  
abline(lm(LAI~diurn.temp), col="red")  
  
plot(LAI~NPP, pch=20, xlab="Grau acum. CO2", ylab="Densitat vegetació (LAI)",  
 main="Densitat de vegetació \n en funció grau acumulació de CO2")  
abline(lm(LAI~NPP), col="red")



layout(1)  
  
#### Es poden extraure les següents conclusions:  
#### La relació lineal entre LAI i NPP és gairebé forta, en canvi, la relació  
#### entre LAI i diurn.temp es feble. Encara així, es pot concloure que una   
#### una planta que acumula major cantitat de CO2 sol ser perte té una major densitat  
#### vegetal i per altra banda, encara que no del tot fiable, es té que una temp. diurna  
#### alta sol anar relacionat aun una menor quantitat de densitat (totalment intuitiu).  
  
## (f)  
  
### Es té 3 variables categòriques: growthform, hemisphere i tropic  
  
attach(df.plantsi)

## The following objects are masked from df.plantsi (pos = 3):  
##   
## diurn.temp, growthform, height, hemisphere, LAI, logheight, NPP,  
## rain, temp, tropic

describeBy(LAI,growthform)

##   
## Descriptive statistics by group   
## group: Fern  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 1 4.04 NA 4.04 4.04 0 4.04 4.04 0 NA NA NA  
## ------------------------------------------------------------   
## group: Herb  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 45 2.59 1.19 2.51 2.57 1.56 0.51 4.51 4 0.07 -1.38 0.18  
## ------------------------------------------------------------   
## group: Herb/Shrub  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 1 3.35 NA 3.35 3.35 0 3.35 3.35 0 NA NA NA  
## ------------------------------------------------------------   
## group: Shrub  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 55 2.44 1.28 2.14 2.31 0.96 1.01 6.99 5.98 1.15 1.15 0.17  
## ------------------------------------------------------------   
## group: Shrub/Tree  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 13 3.95 1.08 4.26 4.15 0.36 1.01 4.72 3.71 -1.78 1.79 0.3  
## ------------------------------------------------------------   
## group: Tree  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 63 3.7 0.9 4.07 3.82 0.65 1.51 4.51 3 -0.87 -0.53 0.11

describeBy(LAI,hemisphere)

##   
## Descriptive statistics by group   
## group: South  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 96 3.26 1.29 4.04 3.33 0.7 1.01 6.99 5.98 -0.23 -0.92 0.13  
## ------------------------------------------------------------   
## group: North  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 82 2.79 1.18 2.78 2.8 1.69 0.51 4.72 4.21 0 -1.19 0.13

describeBy(LAI,tropic)

##   
## Descriptive statistics by group   
## group: Capricorn  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 48 2.26 1 2.1 2.18 0.93 1.01 4.51 3.5 0.79 -0.43 0.15  
## ------------------------------------------------------------   
## group: Tropical  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 65 4.31 0.5 4.26 4.34 0.36 2.51 6.99 4.48 1.27 13.63 0.06  
## ------------------------------------------------------------   
## group: Cancer  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 65 2.37 0.94 2.51 2.35 1.11 0.51 4.26 3.75 0.01 -0.99 0.12

detach(df.plantsi)  
  
library(vioplot)

## Loading required package: sm

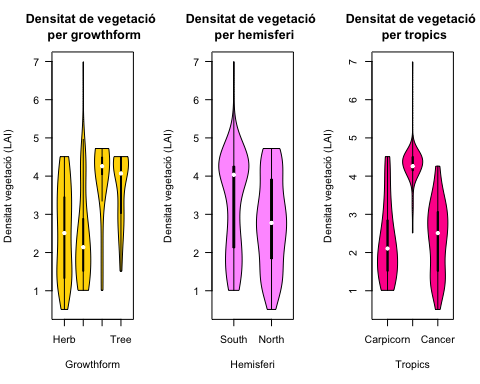
## Package 'sm', version 2.2-5.7: type help(sm) for summary information

## Loading required package: zoo

##   
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':  
##   
## as.Date, as.Date.numeric

layout(matrix(c(1,2,3), nrow=1))  
x1<-df.plantsi$LAI[df.plantsi$growthform=="Fern"] # no posem aquest casos perque només hi ha un  
x2<-df.plantsi$LAI[df.plantsi$growthform=="Herb"]  
x3<-df.plantsi$LAI[df.plantsi$growthform=="Herb/Shrub"] #només hi ha un cas  
x4<-df.plantsi$LAI[df.plantsi$growthform=="Shrub"]  
x5<-df.plantsi$LAI[df.plantsi$growthform=="Shrub/Tree"]  
x6<-df.plantsi$LAI[df.plantsi$growthform=="Tree"]  
vioplot(x2, x4, x5, x6, names=c("Herb","Shrub","Shrub/Tree","Tree"), col="gold",  
 ylab="Densitat vegetació (LAI)",xlab="Growthform",   
 main="Densitat de vegetació \n per growthform", las=1) # no es gràfiquen els casos   
  
  
y1<-df.plantsi$LAI[df.plantsi$hemisphere=="South"]  
y2<-df.plantsi$LAI[df.plantsi$hemisphere=="North"]  
vioplot(y1,y2,names=c("South","North"), ylab="Densitat vegetació (LAI)", xlab="Hemisferi",  
 col=cm.colors(8)[7],las=1, main="Densitat de vegetació \n per hemisferi")  
  
z1<-df.plantsi$LAI[df.plantsi$tropic=="Capricorn"]  
z2<-df.plantsi$LAI[df.plantsi$tropic=="Tropical"]  
z3<-df.plantsi$LAI[df.plantsi$tropic=="Cancer"]  
vioplot(z1,z2,z3,names=c("Carpicorn","Tropical","Cancer"), col=rainbow(10)[10],  
 ylab="Densitat vegetació (LAI)", xlab="Tropics",  
 main="Densitat de vegetació \n per tropics")



layout(1)  
  
  
#### Conclusion: De mediana el growthform amb major LAI es Shrub/Tree, per  
#### en hemisferi Sud i en el zona Tropical.  
  
## (g)  
  
estudiconj(df.plantes[,c("height","diurn.temp","NPP")])

## $Estudi\_univariant  
## min Q1 mediana mitjana Q3 max rang R.I desv desv.med  
## height 0.03 0.7 3.25 8.91 14.48 61 60.97 13.77 11.29 7.84   
## diurn.temp 4.6 7 9.75 9.91 11.7 17.9 13.3 4.7 3.13 2.57   
## NPP 4 490.5 825.5 963.72 1471.5 2337 2333 981 619.41 514.3   
## CV alpha curtosi  
## height 1.27 0.63 5.43   
## diurn.temp 0.32 -0.17 2.53   
## NPP 0.64 0.32 2.08   
##   
## $Covaciancia  
## height diurn.temp NPP  
## height 128.134911 -3.214315 2313.9590  
## diurn.temp -3.214315 9.877274 -767.7566  
## NPP 2313.958965 -767.756560 385838.8657  
##   
## $Correlacio  
## height diurn.temp NPP  
## height 1.00000000 -0.09035167 0.3290932  
## diurn.temp -0.09035167 1.00000000 -0.3932801  
## NPP 0.32909322 -0.39328012 1.0000000  
##   
## $Correlacio2  
## height diurn.temp NPP  
## height 1.000000000 0.008163424 0.1083023  
## diurn.temp 0.008163424 1.000000000 0.1546693  
## NPP 0.108302346 0.154669254 1.0000000

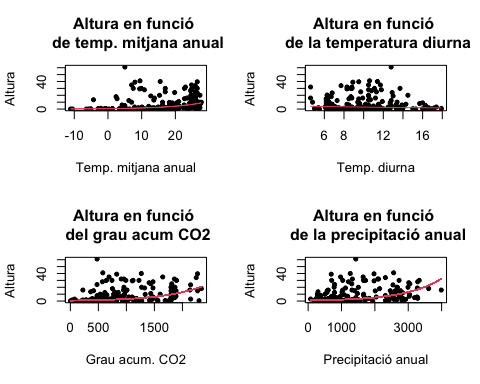
#### NO està la variable logheight  
df.plantes$logheight<-log(df.plantes$height) # ara sí  
  
estudiconj(df.plantes[,c("height","logheight","diurn.temp","NPP", "rain","temp")])

## $Estudi\_univariant  
## min Q1 mediana mitjana Q3 max rang R.I desv   
## height 0.03 0.7 3.25 8.91 14.48 61 60.97 13.77 11.29   
## logheight -3.44 -0.35 1.18 1.06 2.67 4.11 7.55 3.03 1.81   
## diurn.temp 4.6 7 9.75 9.91 11.7 17.9 13.3 4.7 3.13   
## NPP 4 490.5 825.5 963.72 1471.5 2337 2333 981 619.41  
## rain 73 574.75 1044.5 1344.14 2076 3991 3918 1501.25 952.1   
## temp -11.1 9.75 18 16.13 24.75 27.7 38.8 15 9.18   
## desv.med CV alpha curtosi  
## height 7.84 1.27 0.63 5.43   
## logheight 1.52 1.71 -0.01 2.23   
## diurn.temp 2.57 0.32 -0.17 2.53   
## NPP 514.3 0.64 0.32 2.08   
## rain 774.86 0.71 0.37 2.31   
## temp 7.42 0.57 -0.1 2.88   
##   
## $Covaciancia  
## height logheight diurn.temp NPP rain  
## height 128.134911 16.3699678 -3.2143152 2313.9590 4043.7474  
## logheight 16.369968 3.2802069 -0.6554674 558.1226 833.1051  
## diurn.temp -3.214315 -0.6554674 9.8772742 -767.7566 -1512.5214  
## NPP 2313.958965 558.1226046 -767.7565602 385838.8657 469831.5827  
## rain 4043.747408 833.1051004 -1512.5213610 469831.5827 911620.4265  
## temp 23.700174 8.2711969 -1.0997772 3992.1573 4846.3247  
## temp  
## height 23.700174  
## logheight 8.271197  
## diurn.temp -1.099777  
## NPP 3992.157254  
## rain 4846.324678  
## temp 84.692973  
##   
## $Correlacio  
## height logheight diurn.temp NPP rain temp  
## height 1.00000000 0.7984790 -0.09035167 0.3290932 0.3741479 0.22750666  
## logheight 0.79847895 1.0000000 -0.11515476 0.4961077 0.4817727 0.49624261  
## diurn.temp -0.09035167 -0.1151548 1.00000000 -0.3932801 -0.5040527 -0.03802441  
## NPP 0.32909322 0.4961077 -0.39328012 1.0000000 0.7921952 0.69836259  
## rain 0.37414786 0.4817727 -0.50405269 0.7921952 1.0000000 0.55154607  
## temp 0.22750666 0.4962426 -0.03802441 0.6983626 0.5515461 1.00000000  
##   
## $Correlacio2  
## height logheight diurn.temp NPP rain temp  
## height 1.000000000 0.63756863 0.008163424 0.1083023 0.1399866 0.051759281  
## logheight 0.637568635 1.00000000 0.013260619 0.2461229 0.2321049 0.246256728  
## diurn.temp 0.008163424 0.01326062 1.000000000 0.1546693 0.2540691 0.001445856  
## NPP 0.108302346 0.24612290 0.154669254 1.0000000 0.6275732 0.487710302  
## rain 0.139986618 0.23210490 0.254069116 0.6275732 1.0000000 0.304203065  
## temp 0.051759281 0.24625673 0.001445856 0.4877103 0.3042031 1.000000000

### Observant la taula de Correlacio2, aquesta és més alta si es pren la   
### variable logheight. Aleshores, es treballarà amb logheight  
  
#### Per a VARS NUMÈRIQUES:  
attach(df.plantsi)

## The following objects are masked from df.plantsi (pos = 6):  
##   
## diurn.temp, growthform, height, hemisphere, LAI, logheight, NPP,  
## rain, temp, tropic

layout(matrix(c(1,2,3,4),nrow=2, byrow=T))  
logmod4<-lm(logheight~temp)  
heigcoef4<-logmod4$coefficients  
plot(height~temp, pch=20, xlab="Temp. mitjana anual", ylab="Altura",  
 main="Altura en funció \n de temp. mitjana anual")  
x<-seq(min(temp,na.rm=TRUE),max(temp,na.rm=TRUE),by=0.05)  
points(x,exp(heigcoef4[1]+heigcoef4[2]\*x),type="l",col=2)  
  
logmod<-lm(logheight~diurn.temp)  
heigcoef<-logmod$coefficients  
plot(height~diurn.temp, pch=20, xlab="Temp. diurna", ylab="Altura",  
 main="Altura en funció \n de la temperatura diurna")  
x<-seq(min(diurn.temp,na.rm=TRUE),max(diurn.temp,na.rm=TRUE),by=0.05)  
points(x,exp(heigcoef[1]+heigcoef[2]\*x),type="l",col=2)  
  
logmod2<-lm(logheight~NPP)  
heigcoef2<-logmod2$coefficients  
plot(height~NPP, pch=20, xlab="Grau acum. CO2", ylab="Altura",  
 main="Altura en funció \n del grau acum CO2")  
x<-seq(min(NPP,na.rm=TRUE),max(NPP,na.rm=TRUE),by=0.05)  
points(x,exp(heigcoef2[1]+heigcoef2[2]\*x),type="l",col=2)  
  
logmod3<-lm(logheight~rain)  
heigcoef3<-logmod3$coefficients  
plot(height~rain, pch=20, xlab="Precipitació anual", ylab="Altura",  
 main="Altura en funció \n de la precipitació anual")  
x<-seq(min(rain,na.rm=TRUE),max(rain,na.rm=TRUE),by=0.05)  
points(x,exp(heigcoef3[1]+heigcoef3[2]\*x),type="l",col=2)



layout(1)  
detach(df.plantsi)  
  
#### Per a VARS CATEGÒRIQUES:  
  
attach(df.plantsi)

## The following objects are masked from df.plantsi (pos = 6):  
##   
## diurn.temp, growthform, height, hemisphere, LAI, logheight, NPP,  
## rain, temp, tropic

describeBy(height,growthform)

##   
## Descriptive statistics by group   
## group: Fern  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 1 1.8 NA 1.8 1.8 0 1.8 1.8 0 NA NA NA  
## ------------------------------------------------------------   
## group: Herb  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 45 0.88 1.89 0.35 0.53 0.3 0.03 12.4 12.37 5.09 27.94 0.28  
## ------------------------------------------------------------   
## group: Herb/Shrub  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 1 1.5 NA 1.5 1.5 0 1.5 1.5 0 NA NA NA  
## ------------------------------------------------------------   
## group: Shrub  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 55 2.29 1.84 1.7 2.07 1.78 0.07 8 7.93 1.05 0.65 0.25  
## ------------------------------------------------------------   
## group: Shrub/Tree  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 13 7.58 3.45 7 7.27 4.45 3.5 15 11.5 0.64 -0.75 0.96  
## ------------------------------------------------------------   
## group: Tree  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 63 20.93 11.11 19 20.06 13.34 5 61 56 0.88 0.88 1.4

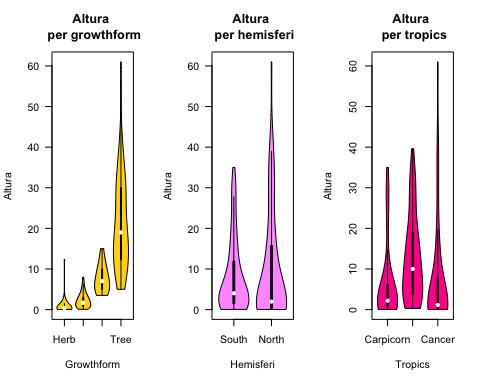
describeBy(height,hemisphere)

##   
## Descriptive statistics by group   
## group: South  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 96 8.1 9.13 4 6.52 5.19 0.05 35 34.95 1.3 0.63 0.93  
## ------------------------------------------------------------   
## group: North  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 82 9.85 13.43 1.97 7.36 2.8 0.03 61 60.97 1.5 1.62 1.48

describeBy(height,tropic)

##   
## Descriptive statistics by group   
## group: Capricorn  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 48 6.41 9.48 2.21 4.55 2.54 0.05 35 34.95 1.78 1.83 1.37  
## ------------------------------------------------------------   
## group: Tropical  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 65 12.5 10.5 10 11.45 10.38 0.3 39.6 39.3 0.77 -0.46 1.3  
## ------------------------------------------------------------   
## group: Cancer  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 65 7.17 12.53 1.15 4.21 1.48 0.03 61 60.97 2.27 5 1.55

detach(df.plantsi)  
  
layout(matrix(c(1,2,3), nrow=1))  
x1<-df.plantsi$height[df.plantsi$growthform=="Fern"] # no posem aquest casos perque només hi ha un  
x2<-df.plantsi$height[df.plantsi$growthform=="Herb"]  
x3<-df.plantsi$height[df.plantsi$growthform=="Herb/Shrub"] #només hi ha un cas  
x4<-df.plantsi$height[df.plantsi$growthform=="Shrub"]  
x5<-df.plantsi$height[df.plantsi$growthform=="Shrub/Tree"]  
x6<-df.plantsi$height[df.plantsi$growthform=="Tree"]  
vioplot(x2, x4, x5, x6, names=c("Herb","Shrub","Shrub/Tree","Tree"), col="gold",  
 ylab="Altura",xlab="Growthform",   
 main="Altura \n per growthform", las=1) # no es gràfiquen els casos   
  
  
y1<-df.plantsi$height[df.plantsi$hemisphere=="South"]  
y2<-df.plantsi$height[df.plantsi$hemisphere=="North"]  
vioplot(y1,y2,names=c("South","North"), ylab="Altura", xlab="Hemisferi",  
 col=cm.colors(8)[7],las=1, main="Altura \n per hemisferi")  
  
z1<-df.plantsi$height[df.plantsi$tropic=="Capricorn"]  
z2<-df.plantsi$height[df.plantsi$tropic=="Tropical"]  
z3<-df.plantsi$height[df.plantsi$tropic=="Cancer"]  
vioplot(z1,z2,z3,names=c("Carpicorn","Tropical","Cancer"), col=rainbow(10)[10],  
 ylab="Altura", xlab="Tropics",  
 main="Altura \n per tropics")



layout(1)  
  
## Pas (5): Preguntes  
  
### Material per justificar les respostes  
  
#### 4.  
estudiconj(df.plantes[sapply(df.plantes,class)=="numeric"])[[4]][,c(3,29)]

## height logheight  
## sort\_number 4.695708e-03 0.008568792  
## site 1.997387e-05 0.038536741  
## height 1.000000e+00 0.637568635  
## loght 6.375686e-01 1.000000000  
## lat 6.991375e-02 0.232861619  
## long 1.480303e-03 0.068086167  
## alt 2.025622e-03 0.021413144  
## temp 5.175928e-02 0.246256728  
## diurn.temp 8.163424e-03 0.013260619  
## isotherm 6.371390e-02 0.168321113  
## temp.seas 5.846390e-02 0.175351028  
## temp.max.warm 2.296288e-02 0.157361750  
## temp.min.cold 6.466340e-02 0.248611934  
## temp.ann.range 5.380870e-02 0.152212957  
## temp.mean.wetqr 3.770351e-02 0.189257034  
## temp.mean.dryqr 4.792880e-02 0.192718518  
## temp.mean.warmqr 3.154319e-02 0.206091376  
## temp.mean.coldqr 5.848625e-02 0.242563786  
## rain 1.399866e-01 0.232104897  
## rain.wetm 1.425375e-01 0.239967854  
## rain.drym 5.558071e-02 0.106260453  
## rain.seas 4.394345e-05 0.004773842  
## rain.wetqr 1.440045e-01 0.239501116  
## rain.dryqr 6.976081e-02 0.119004191  
## rain.warmqr 5.204321e-02 0.173362358  
## rain.coldqr 1.514664e-01 0.099983772  
## LAI 1.117157e-01 0.224972841  
## NPP 1.083023e-01 0.246122896  
## logheight 6.375686e-01 1.000000000

#### 5.  
library(stats)  
cormat<-round(cor(df.plantes[sapply(df.plantes,class)=="numeric"]),2)  
library(lattice)  
levelplot(t(cormat[,c(3,27)]))

