**#1. Load the data (recruitment\_data.csv) file and perform the following,**

x<-read.csv("C:/Users/ASHISH/Desktop/STATS EXAM/recruitment\_data.csv")

**#a) Delete all missing value rows and report the reduced data frame**

na.omit(x)

**output:-**

attrition performance\_rating sales\_quota\_pct recruiting\_source

1 1 3 1.088190157 Applied Online

3 1 2 0.497530207 Campus

5 0 3 1.424788765 Applied Online

6 1 3 0.548123240 Referral

7 1 3 0.794213479 Applied Online

8 0 2 1.006524423 Referral

9 0 3 1.519917288 Campus

13 0 4 0.860352798 Campus

14 0 3 0.362379477 Applied Online

17 0 3 2.471432940 Applied Online

19 0 3 0.313105850 Campus

20 0 3 0.084894907 Applied Online

25 0 2 1.942499255 Applied Online

26 0 3 0.988873487 Referral

28 1 2 1.867938849 Search Firm

29 0 3 1.218996454 Campus

34 1 2 0.843784332 Applied Online

35 0 3 1.406429710 Applied Online

36 1 2 0.512394781 Applied Online

39 0 3 1.294592317 Search Firm

45 0 2 1.001371648 Referral

48 1 3 0.195860118 Referral

49 0 3 0.690769357 Applied Online

51 1 2 1.593054023 Applied Online

55 0 2 1.753637434 Applied Online

56 1 3 0.854792764 Applied Online

58 1 2 -0.020178623 Campus

66 0 2 1.436987733 Campus

67 0 3 -0.061589749 Campus

68 0 2 1.426110850 Applied Online

71 0 3 0.664018071 Applied Online

72 0 3 1.018546915 Applied Online

76 0 2 1.840430662 Applied Online

81 0 3 0.502660186 Campus

85 0 4 1.194558455 Applied Online

87 1 3 1.671099171 Applied Online

89 0 3 1.350383983 Applied Online

90 0 3 0.825790823 Referral

94 0 3 -0.627667242 Applied Online

95 0 2 1.327002902 Referral

96 0 2 1.108375490 Applied Online

97 0 4 2.198443693 Applied Online

99 1 4 2.013827679 Applied Online

100 0 3 2.483458702 Referral

102 0 2 0.910585327 Applied Online

103 1 2 2.054257303 Applied Online

105 1 4 3.030339820 Campus

106 1 3 1.258933317 Search Firm

109 1 2 1.507767255 Applied Online

110 0 3 0.700070507 Applied Online

111 0 3 -0.191553685 Applied Online

113 0 3 0.793227355 Referral

114 0 2 0.620710627 Applied Online

115 0 4 0.116946194 Campus

117 0 4 2.057038371 Applied Online

119 1 4 0.035466235 Applied Online

120 1 1 2.120180376 Referral

123 0 3 -0.064948041 Search Firm

125 0 3 1.648829261 Referral

126 0 2 0.937444501 Applied Online

132 0 4 0.982009290 Referral

134 0 3 0.493475938 Campus

135 1 3 0.660728944 Referral

136 0 3 1.104281974 Applied Online

137 0 2 2.176899621 Applied Online

138 0 4 0.216156754 Campus

142 1 3 0.355827084 Applied Online

143 0 3 1.161503164 Campus

144 0 4 2.771073842 Applied Online

146 1 3 0.935256114 Campus

147 1 4 0.048859033 Campus

149 0 3 0.366818274 Campus

151 1 3 1.174485551 Applied Online

152 0 4 -0.016602116 Applied Online

153 0 2 0.942639118 Applied Online

155 1 3 0.305507891 Referral

156 0 3 1.735344422 Campus

157 0 3 1.917376994 Campus

159 0 2 1.823216145 Applied Online

160 0 3 0.580933906 Applied Online

161 1 3 0.862315623 Applied Online

163 1 2 -0.628092241 Search Firm

166 0 3 0.154740784 Referral

167 0 2 3.666739696 Referral

170 0 3 0.506631772 Applied Online

171 0 3 0.542305963 Applied Online

172 0 3 0.558393493 Campus

174 0 3 1.408470099 Applied Online

176 1 4 1.338921353 Campus

177 0 3 0.856272111 Applied Online

179 1 3 0.826998224 Applied Online

180 0 3 1.636727421 Applied Online

181 0 2 1.470579429 Applied Online

182 0 3 0.681826178 Referral

183 1 3 0.453488880 Referral

190 0 2 0.317765084 Referral

191 0 3 0.281994798 Referral

192 0 4 0.490143880 Campus

193 0 3 0.416650251 Applied Online

194 0 4 0.945723570 Applied Online

195 0 3 1.073352538 Applied Online

197 0 3 1.315082150 Campus

198 1 3 0.258704510 Referral

199 0 2 1.081976577 Campus

200 0 2 -0.239220234 Campus

203 0 3 0.248797122 Applied Online

204 1 3 0.221469974 Applied Online

205 0 5 1.665593992 Campus

206 0 3 1.552585919 Campus

209 1 3 0.809937644 Referral

210 0 3 1.105027368 Applied Online

212 1 4 0.109309834 Referral

215 0 3 0.957395105 Applied Online

216 0 3 1.491404543 Referral

219 0 3 1.690935800 Campus

222 1 3 1.663377563 Campus

226 0 3 0.411784209 Campus

227 0 4 0.357512115 Campus

228 1 3 1.595867559 Search Firm

232 0 3 1.109400042 Applied Online

235 0 3 0.508258710 Applied Online

237 0 3 1.857963499 Applied Online

238 0 4 0.242411829 Referral

241 0 3 0.618811781 Campus

242 1 4 1.262574157 Referral

244 0 2 0.731789330 Referral

245 1 3 0.074701078 Applied Online

246 0 3 1.682681099 Applied Online

250 0 2 0.936424442 Applied Online

251 1 2 1.081317484 Campus

252 0 3 2.028644952 Applied Online

254 1 3 1.208969055 Applied Online

255 0 4 1.468460583 Applied Online

258 0 3 0.533871577 Campus

260 1 3 1.477102849 Applied Online

261 0 3 0.421961082 Referral

263 0 3 1.318269195 Referral

264 0 4 -0.343168791 Applied Online

267 0 3 2.177178919 Applied Online

269 0 3 0.106998799 Applied Online

270 0 3 0.962445715 Applied Online

272 0 2 -0.474431203 Campus

275 1 2 0.747415336 Applied Online

278 0 3 0.304051687 Applied Online

282 1 3 0.078210552 Applied Online

286 1 3 -0.501627157 Applied Online

291 0 3 0.717144277 Applied Online

292 0 3 1.461405202 Applied Online

294 1 3 -0.000742015 Applied Online

295 1 3 0.749782500 Applied Online

296 0 3 -0.556073302 Campus

297 0 3 0.546598130 Applied Online

298 0 2 1.183785733 Applied Online

299 0 4 0.888142737 Applied Online

300 0 3 2.213574342 Applied Online

301 0 2 1.645100618 Applied Online

302 0 3 1.285935121 Applied Online

303 0 3 0.816504373 Applied Online

304 1 4 1.988065585 Applied Online

305 0 3 1.435099700 Applied Online

306 0 3 1.254773432 Applied Online

307 1 3 0.021239265 Campus

308 0 3 0.862524227 Applied Online

309 0 2 1.870081964 Referral

312 0 3 1.325476425 Search Firm

313 0 3 1.095198940 Referral

314 0 3 0.567705932 Campus

316 0 3 0.806493232 Applied Online

317 0 3 1.677442930 Campus

318 1 3 0.589331436 Campus

319 1 3 1.082227877 Applied Online

321 0 2 0.816487675 Applied Online

322 0 4 1.054034102 Referral

324 0 3 1.167023323 Applied Online

325 0 2 0.421217115 Referral

330 0 2 0.678046205 Search Firm

331 0 3 2.142735936 Referral

333 0 3 0.307372253 Applied Online

335 0 3 1.003446279 Applied Online

338 0 3 0.979641159 Campus

339 0 2 0.903977583 Campus

341 0 2 2.142970179 Campus

342 0 2 0.778561531 Campus

345 0 4 0.988988543 Campus

346 1 3 0.788227605 Referral

348 1 3 1.130758296 Referral

349 0 3 1.277324571 Campus

350 0 3 1.605641198 Applied Online

353 0 3 0.780372890 Referral

355 0 4 1.157426664 Applied Online

356 0 2 1.760735094 Applied Online

357 0 3 1.052279905 Applied Online

358 0 3 0.108202056 Applied Online

360 0 3 1.423949524 Referral

361 1 3 0.483354792 Applied Online

366 0 2 1.305396927 Applied Online

368 1 1 1.012150937 Campus

369 1 2 0.933976682 Campus

370 0 1 1.976906211 Applied Online

372 0 3 1.990580529 Applied Online

373 1 3 3.234485647 Campus

376 0 3 0.732530182 Applied Online

377 1 4 1.379483753 Applied Online

378 1 3 1.473682410 Campus

380 0 3 0.990032764 Applied Online

381 1 2 1.066526624 Referral

383 0 3 2.470670075 Applied Online

385 0 3 1.704484050 Applied Online

386 0 2 1.367603566 Campus

390 0 2 0.554076497 Applied Online

391 0 3 0.073589697 Applied Online

392 0 3 0.225125632 Campus

395 0 4 0.911799052 Applied Online

396 1 3 1.352784368 Search Firm

400 0 4 1.311785795 Applied Online

401 1 3 0.695102918 Applied Online

403 0 2 0.004189019 Applied Online

405 0 4 1.224023847 Applied Online

406 0 2 1.596278903 Applied Online

407 0 3 0.189004418 Search Firm

408 0 4 1.107191611 Referral

411 1 2 -0.072747228 Applied Online

412 0 3 0.398907674 Campus

413 1 2 1.157802546 Applied Online

414 0 4 0.819293078 Applied Online

415 0 3 1.745684881 Applied Online

416 1 2 1.414428123 Campus

417 0 4 0.980898068 Applied Online

420 0 3 1.023242508 Referral

424 1 1 2.025424788 Referral

428 0 4 0.905464925 Applied Online

429 0 3 0.939095326 Referral

431 0 2 1.395772056 Referral

433 0 5 1.393015457 Applied Online

434 1 3 1.575000136 Applied Online

438 0 2 0.632941547 Applied Online

440 1 3 -0.145815729 Campus

441 0 3 1.373084852 Applied Online

442 0 3 1.627813003 Campus

443 1 4 0.689682319 Referral

445 0 4 1.598213055 Applied Online

**b)Check the variable ‘sales\_quota\_pct’, for its normality, justify with suitable plots**

x1<-(x$sales\_quota\_pct)

x1

**output:-**

[1] 1.088190157 2.394172623 0.497530207 2.513957731 1.424788765

[6] 0.548123240 0.794213479 1.006524423 1.519917288 2.073527866

[11] 2.189802559 0.276887239 0.860352798 0.362379477 1.259364793

[16] 1.635204729 2.471432940 1.889282543 0.313105850 0.084894907

[21] 0.294166238 1.047767039 0.297146809 0.089811249 1.942499255

[26] 0.988873487 1.426180278 1.867938849 1.218996454 1.232504584

[31] 1.281032455 1.882751518 0.077577352 0.843784332 1.406429710

[36] 0.512394781 1.697747688 2.368077743 1.294592317 1.998023181

[41] 0.612543226 1.374363731 1.836250239 2.483203774 1.001371648

[46] 0.998780174 1.375243399 0.195860118 0.690769357 0.836792613

[51] 1.593054023 0.012562472 0.515351004 0.722371977 1.753637434

[56] 0.854792764 1.431080449 -0.020178623 2.942745963 1.338201418

[61] 1.827917893 -0.108427445 1.285228430 0.089918811 -0.710827220

[66] 1.436987733 -0.061589749 1.426110850 1.207963542 0.358115227

[71] 0.664018071 1.018546915 0.770947336 0.884285599 1.219848333

[76] 1.840430662 1.204520098 0.301921499 0.317763404 1.892721443

[81] 0.502660186 1.463904752 0.519997932 0.885799936 1.194558455

[86] 1.323073475 1.671099171 1.048954229 1.350383983 0.825790823

[91] 2.232744338 0.728991328 1.625214862 -0.627667242 1.327002902

[96] 1.108375490 2.198443693 0.841712569 2.013827679 2.483458702

[101] 0.949398002 0.910585327 2.054257303 1.244479484 3.030339820

[106] 1.258933317 1.681309977 0.363328168 1.507767255 0.700070507

[111] -0.191553685 0.770685877 0.793227355 0.620710627 0.116946194

[116] 1.228210832 2.057038371 0.844923781 0.035466235 2.120180376

[121] 0.185892117 0.339706837 -0.064948041 1.385696871 1.648829261

[126] 0.937444501 1.288153467 1.535168221 0.641408940 1.694393964

[131] 1.738973727 0.982009290 1.231498687 0.493475938 0.660728944

[136] 1.104281974 2.176899621 0.216156754 1.070613974 1.177207728

[141] 1.228053130 0.355827084 1.161503164 2.771073842 2.461105608

[146] 0.935256114 0.048859033 1.622923193 0.366818274 1.483391065

[151] 1.174485551 -0.016602116 0.942639118 0.343975910 0.305507891

[156] 1.735344422 1.917376994 1.003336630 1.823216145 0.580933906

[161] 0.862315623 1.830012420 -0.628092241 0.698295612 0.442878876

[166] 0.154740784 3.666739696 1.531314524 0.022656566 0.506631772

[171] 0.542305963 0.558393493 2.439220676 1.408470099 1.942703084

[176] 1.338921353 0.856272111 1.322863733 0.826998224 1.636727421

[181] 1.470579429 0.681826178 0.453488880 1.092639053 1.343816782

[186] 0.221171244 0.643060014 0.362492261 1.201645882 0.317765084

[191] 0.281994798 0.490143880 0.416650251 0.945723570 1.073352538

[196] 1.658876117 1.315082150 0.258704510 1.081976577 -0.239220234

[201] 0.620626797 0.731358532 0.248797122 0.221469974 1.665593992

[206] 1.552585919 0.837359252 1.424137717 0.809937644 1.105027368

[211] 0.720152091 0.109309834 1.650772237 2.793883517 0.957395105

[216] 1.491404543 0.665422103 0.622061728 1.690935800 1.179820539

[221] -0.153714231 1.663377563 0.831988367 1.525258677 1.706387788

[226] 0.411784209 0.357512115 1.595867559 1.915215231 -0.119204360

[231] 1.486118567 1.109400042 0.656540855 1.461855977 0.508258710

[236] 1.038528903 1.857963499 0.242411829 0.507937300 1.103767671

[241] 0.618811781 1.262574157 1.626582750 0.731789330 0.074701078

[246] 1.682681099 0.352317828 1.930965318 0.745237564 0.936424442

[251] 1.081317484 2.028644952 0.771655681 1.208969055 1.468460583

[256] 1.938368883 1.339458917 0.533871577 0.752130816 1.477102849

[261] 0.421961082 0.413405819 1.318269195 -0.343168791 1.208970731

[266] 0.732299192 2.177178919 1.062728391 0.106998799 0.962445715

[271] 1.962287226 -0.474431203 0.751305789 1.144016678 0.747415336

[276] 1.380361909 1.211290385 0.304051687 1.532879038 0.623296216

[281] 0.437884571 0.078210552 1.129233586 0.283742458 -0.177927920

[286] -0.501627157 0.490952369 2.091629402 2.037166625 -0.146973506

[291] 0.717144277 1.461405202 1.883046630 -0.000742015 0.749782500

[296] -0.556073302 0.546598130 1.183785733 0.888142737 2.213574342

[301] 1.645100618 1.285935121 0.816504373 1.988065585 1.435099700

[306] 1.254773432 0.021239265 0.862524227 1.870081964 0.648029032

[311] 0.877495407 1.325476425 1.095198940 0.567705932 1.185428086

[316] 0.806493232 1.677442930 0.589331436 1.082227877 1.839045875

[321] 0.816487675 1.054034102 2.417564617 1.167023323 0.421217115

[326] 1.770043949 1.855515727 0.428448092 2.898711647 0.678046205

[331] 2.142735936 1.650863337 0.307372253 1.487482154 1.003446279

[336] 0.277417950 0.582814736 0.979641159 0.903977583 2.139065803

[341] 2.142970179 0.778561531 2.127353517 1.069671234 0.988988543

[346] 0.788227605 1.722293712 1.130758296 1.277324571 1.605641198

[351] 1.221326786 1.543076133 0.780372890 1.056961976 1.157426664

[356] 1.760735094 1.052279905 0.108202056 0.974838741 1.423949524

[361] 0.483354792 1.189875173 0.768436686 1.849890061 2.288391987

[366] 1.305396927 2.258611473 1.012150937 0.933976682 1.976906211

[371] 0.653688869 1.990580529 3.234485647 1.339692127 0.696942954

[376] 0.732530182 1.379483753 1.473682410 2.485427974 0.990032764

[381] 1.066526624 1.551184022 2.470670075 1.454572852 1.704484050

[386] 1.367603566 2.619788839 0.448972691 1.332613846 0.554076497

[391] 0.073589697 0.225125632 1.442556539 0.855016053 0.911799052

[396] 1.352784368 0.757370573 1.864682404 -0.257621925 1.311785795

[401] 0.695102918 0.370700323 0.004189019 2.316501151 1.224023847

[406] 1.596278903 0.189004418 1.107191611 2.541599372 1.300826887

[411] -0.072747228 0.398907674 1.157802546 0.819293078 1.745684881

[416] 1.414428123 0.980898068 -0.545416054 0.964722136 1.023242508

[421] 0.895039339 1.226800607 0.524139017 2.025424788 1.964209079

[426] 1.221436174 0.326437780 0.905464925 0.939095326 0.323882230

[431] 1.395772056 0.931555168 1.393015457 1.575000136 1.499696037

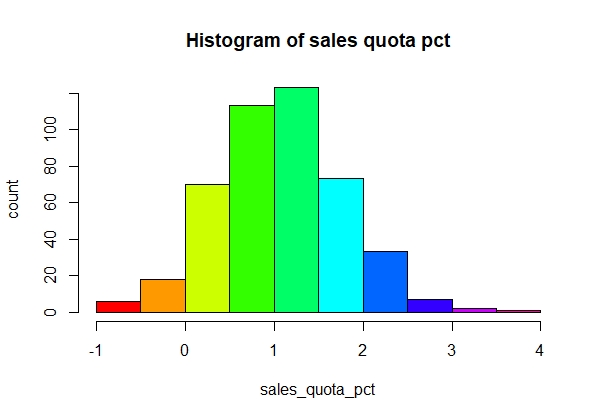
[436] 1.915418290 2.164956548 0.632941547 -0.231351070 -0.145815729

[441] 1.373084852 1.627813003 0.689682319 1.196198038 1.598213055

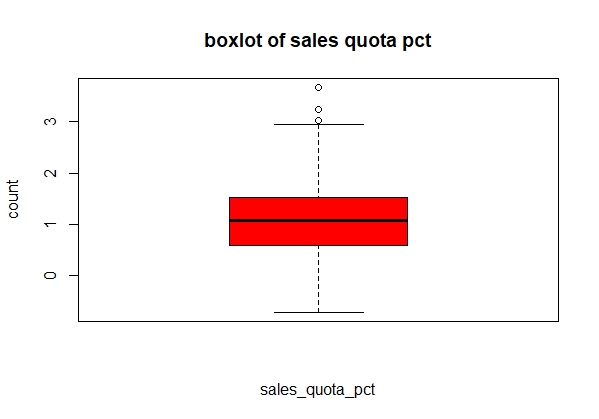
[446] 0.582642409

library(dplyr)

hist(x1,col=rainbow(10),xlab="sales\_quota\_pct",ylab="count",main = "Histogram of sales quota pct")

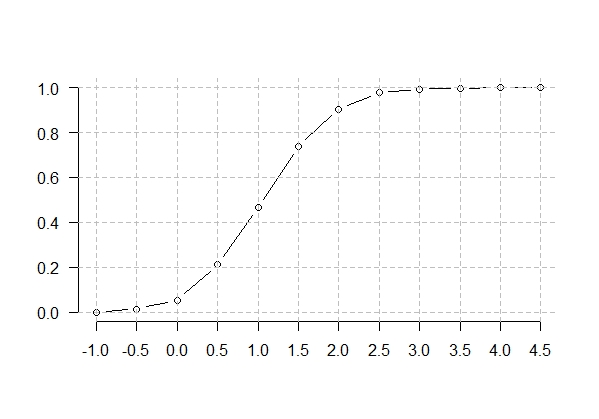


boxplot(x1,col=rainbow(10),xlab="sales\_quota\_pct",ylab="count",main = "boxlot of sales quota pct")



library("agricolae")

x1\_ogive<-hist(x1)

ogive.freq(x1\_ogive) 

**c)Check whether the sales\_quota\_pct vary significantly with respect to the mode of requirement (Referral candidates Vs Applied Online)**

data<-split(x,x$recruiting\_source)

data

|  |
| --- |
| $`Applied Online`  attrition performance\_rating sales\_quota\_pct recruiting\_source  1 1 3 1.088190157 Applied Online  5 0 3 1.424788765 Applied Online  7 1 3 0.794213479 Applied Online  14 0 3 0.362379477 Applied Online  17 0 3 2.471432940 Applied Online  20 0 3 0.084894907 Applied Online  25 0 2 1.942499255 Applied Online  34 1 2 0.843784332 Applied Online  35 0 3 1.406429710 Applied Online  36 1 2 0.512394781 Applied Online  49 0 3 0.690769357 Applied Online  51 1 2 1.593054023 Applied Online  55 0 2 1.753637434 Applied Online  56 1 3 0.854792764 Applied Online  68 0 2 1.426110850 Applied Online  71 0 3 0.664018071 Applied Online  72 0 3 1.018546915 Applied Online  76 0 2 1.840430662 Applied Online  85 0 4 1.194558455 Applied Online  87 1 3 1.671099171 Applied Online  89 0 3 1.350383983 Applied Online  94 0 3 -0.627667242 Applied Online  96 0 2 1.108375490 Applied Online  97 0 4 2.198443693 Applied Online  99 1 4 2.013827679 Applied Online  102 0 2 0.910585327 Applied Online  103 1 2 2.054257303 Applied Online  109 1 2 1.507767255 Applied Online  110 0 3 0.700070507 Applied Online  111 0 3 -0.191553685 Applied Online  114 0 2 0.620710627 Applied Online  117 0 4 2.057038371 Applied Online  119 1 4 0.035466235 Applied Online  126 0 2 0.937444501 Applied Online  136 0 3 1.104281974 Applied Online  137 0 2 2.176899621 Applied Online  142 1 3 0.355827084 Applied Online  144 0 4 2.771073842 Applied Online  151 1 3 1.174485551 Applied Online  152 0 4 -0.016602116 Applied Online  153 0 2 0.942639118 Applied Online  159 0 2 1.823216145 Applied Online  160 0 3 0.580933906 Applied Online  161 1 3 0.862315623 Applied Online  170 0 3 0.506631772 Applied Online  171 0 3 0.542305963 Applied Online  174 0 3 1.408470099 Applied Online  177 0 3 0.856272111 Applied Online  179 1 3 0.826998224 Applied Online  180 0 3 1.636727421 Applied Online  181 0 2 1.470579429 Applied Online  193 0 3 0.416650251 Applied Online  194 0 4 0.945723570 Applied Online  195 0 3 1.073352538 Applied Online  203 0 3 0.248797122 Applied Online  204 1 3 0.221469974 Applied Online  210 0 3 1.105027368 Applied Online  215 0 3 0.957395105 Applied Online  232 0 3 1.109400042 Applied Online  235 0 3 0.508258710 Applied Online  237 0 3 1.857963499 Applied Online  245 1 3 0.074701078 Applied Online  246 0 3 1.682681099 Applied Online  250 0 2 0.936424442 Applied Online  252 0 3 2.028644952 Applied Online  254 1 3 1.208969055 Applied Online  255 0 4 1.468460583 Applied Online  260 1 3 1.477102849 Applied Online  264 0 4 -0.343168791 Applied Online  267 0 3 2.177178919 Applied Online  269 0 3 0.106998799 Applied Online  270 0 3 0.962445715 Applied Online  275 1 2 0.747415336 Applied Online  278 0 3 0.304051687 Applied Online  282 1 3 0.078210552 Applied Online  286 1 3 -0.501627157 Applied Online  291 0 3 0.717144277 Applied Online  292 0 3 1.461405202 Applied Online  294 1 3 -0.000742015 Applied Online  295 1 3 0.749782500 Applied Online  297 0 3 0.546598130 Applied Online  298 0 2 1.183785733 Applied Online  299 0 4 0.888142737 Applied Online  300 0 3 2.213574342 Applied Online  301 0 2 1.645100618 Applied Online  302 0 3 1.285935121 Applied Online  303 0 3 0.816504373 Applied Online  304 1 4 1.988065585 Applied Online  305 0 3 1.435099700 Applied Online  306 0 3 1.254773432 Applied Online  308 0 3 0.862524227 Applied Online  316 0 3 0.806493232 Applied Online  319 1 3 1.082227877 Applied Online  321 0 2 0.816487675 Applied Online  324 0 3 1.167023323 Applied Online  333 0 3 0.307372253 Applied Online  335 0 3 1.003446279 Applied Online  350 0 3 1.605641198 Applied Online  355 0 4 1.157426664 Applied Online  356 0 2 1.760735094 Applied Online  357 0 3 1.052279905 Applied Online  358 0 3 0.108202056 Applied Online  361 1 3 0.483354792 Applied Online  366 0 2 1.305396927 Applied Online  370 0 1 1.976906211 Applied Online  372 0 3 1.990580529 Applied Online  376 0 3 0.732530182 Applied Online  377 1 4 1.379483753 Applied Online  380 0 3 0.990032764 Applied Online  383 0 3 2.470670075 Applied Online  385 0 3 1.704484050 Applied Online  390 0 2 0.554076497 Applied Online  391 0 3 0.073589697 Applied Online  395 0 4 0.911799052 Applied Online  400 0 4 1.311785795 Applied Online  401 1 3 0.695102918 Applied Online  403 0 2 0.004189019 Applied Online  405 0 4 1.224023847 Applied Online  406 0 2 1.596278903 Applied Online  411 1 2 -0.072747228 Applied Online  413 1 2 1.157802546 Applied Online  414 0 4 0.819293078 Applied Online  415 0 3 1.745684881 Applied Online  417 0 4 0.980898068 Applied Online  428 0 4 0.905464925 Applied Online  433 0 5 1.393015457 Applied Online  434 1 3 1.575000136 Applied Online  438 0 2 0.632941547 Applied Online  441 0 3 1.373084852 Applied Online  445 0 4 1.598213055 Applied Online  $Campus  attrition performance\_rating sales\_quota\_pct recruiting\_source  3 1 2 0.49753021 Campus  9 0 3 1.51991729 Campus  13 0 4 0.86035280 Campus  19 0 3 0.31310585 Campus  29 0 3 1.21899645 Campus  58 1 2 -0.02017862 Campus  66 0 2 1.43698773 Campus  67 0 3 -0.06158975 Campus  81 0 3 0.50266019 Campus  105 1 4 3.03033982 Campus  115 0 4 0.11694619 Campus  134 0 3 0.49347594 Campus  138 0 4 0.21615675 Campus  143 0 3 1.16150316 Campus  146 1 3 0.93525611 Campus  147 1 4 0.04885903 Campus  149 0 3 0.36681827 Campus  156 0 3 1.73534442 Campus  157 0 3 1.91737699 Campus  172 0 3 0.55839349 Campus  176 1 4 1.33892135 Campus  192 0 4 0.49014388 Campus  197 0 3 1.31508215 Campus  199 0 2 1.08197658 Campus  200 0 2 -0.23922023 Campus  205 0 5 1.66559399 Campus  206 0 3 1.55258592 Campus  219 0 3 1.69093580 Campus  222 1 3 1.66337756 Campus  226 0 3 0.41178421 Campus  227 0 4 0.35751212 Campus  241 0 3 0.61881178 Campus  251 1 2 1.08131748 Campus  258 0 3 0.53387158 Campus  272 0 2 -0.47443120 Campus  296 0 3 -0.55607330 Campus  307 1 3 0.02123927 Campus  314 0 3 0.56770593 Campus  317 0 3 1.67744293 Campus  318 1 3 0.58933144 Campus  338 0 3 0.97964116 Campus  339 0 2 0.90397758 Campus  341 0 2 2.14297018 Campus  342 0 2 0.77856153 Campus  345 0 4 0.98898854 Campus  349 0 3 1.27732457 Campus  368 1 1 1.01215094 Campus  369 1 2 0.93397668 Campus  373 1 3 3.23448565 Campus  378 1 3 1.47368241 Campus  386 0 2 1.36760357 Campus  392 0 3 0.22512563 Campus  412 0 3 0.39890767 Campus  416 1 2 1.41442812 Campus  440 1 3 -0.14581573 Campus  442 0 3 1.62781300 Campus  $Referral  attrition performance\_rating sales\_quota\_pct recruiting\_source  6 1 3 0.5481232 Referral  8 0 2 1.0065244 Referral  26 0 3 0.9888735 Referral  45 0 2 1.0013716 Referral  48 1 3 0.1958601 Referral  90 0 3 0.8257908 Referral  95 0 2 1.3270029 Referral  100 0 3 2.4834587 Referral  113 0 3 0.7932274 Referral  120 1 1 2.1201804 Referral  125 0 3 1.6488293 Referral  132 0 4 0.9820093 Referral  135 1 3 0.6607289 Referral  155 1 3 0.3055079 Referral  166 0 3 0.1547408 Referral  167 0 2 3.6667397 Referral  182 0 3 0.6818262 Referral  183 1 3 0.4534889 Referral  190 0 2 0.3177651 Referral  191 0 3 0.2819948 Referral  198 1 3 0.2587045 Referral  209 1 3 0.8099376 Referral  212 1 4 0.1093098 Referral  216 0 3 1.4914045 Referral  238 0 4 0.2424118 Referral  242 1 4 1.2625742 Referral  244 0 2 0.7317893 Referral  261 0 3 0.4219611 Referral  263 0 3 1.3182692 Referral  309 0 2 1.8700820 Referral  313 0 3 1.0951989 Referral  322 0 4 1.0540341 Referral  325 0 2 0.4212171 Referral  331 0 3 2.1427359 Referral  346 1 3 0.7882276 Referral  348 1 3 1.1307583 Referral  353 0 3 0.7803729 Referral  360 0 3 1.4239495 Referral  381 1 2 1.0665266 Referral  408 0 4 1.1071916 Referral  420 0 3 1.0232425 Referral  424 1 1 2.0254248 Referral  429 0 3 0.9390953 Referral  431 0 2 1.3957721 Referral  443 1 4 0.6896823 Referral  $`Search Firm`  attrition performance\_rating sales\_quota\_pct recruiting\_source  28 1 2 1.86793885 Search Firm  39 0 3 1.29459232 Search Firm  106 1 3 1.25893332 Search Firm  123 0 3 -0.06494804 Search Firm  163 1 2 -0.62809224 Search Firm  228 1 3 1.59586756 Search Firm  312 0 3 1.32547642 Search Firm  330 0 2 0.67804621 Search Firm  396 1 3 1.35278437 Search Firm  407 0 3 0.18900442 Search Firm |
| d)Check the proportion of Attrition vary significantly or not, with respect to all mode of recruitment |
| |  | | --- | |  | |

x2<-table(x$attrition,x$recruiting\_source)

Applied Online Campus Referral Search Firm

0 98 40 30 5

1 32 16 15 5

pp\_appliedonline<-x2[,1]/sum(x2[1,1])

0 1

1.0000000 0.3265306

pp\_campus<-x2[,1]/sum(x2[1,2])

0 1

2.45 0.80

pp\_referral<-x2[,1]/sum(x2[1,3])

0 1

3.266667 1.066667

pp\_search<-x2[,1]/sum(x2[1,4])

0 1

* 1. 6.4

**2)Load the data (prima-indians-diabetes.csv) file and do the following,** [5 Marks]

y<-read.csv("C:/Users/ASHISH/Desktop/STATS EXAM/prima-indians-diabetes+%281%29.csv",header = F)

**a)Assign the following column names for (V1- V9) in the order of following header names, [No. of times Pregnant, glucose concentration, Blood pressure, Skin Thickness, Insulin, Body Mass Index, Diabetes Pedigree Function, Age, Class]**

names(y)

[1] "V1" "V2" "V3" "V4" "V5" "V6" "V7" "V8" "V9"

colnames(y)<-c('No. of times Pregnant','glucose concentration','Blood pressure','Skin Thickness',' Insulin','Body Mass Index','Diabetes Pedigree Function','Age','Class')

names(y)

[1] "No. of times Pregnant" "glucose concentration"

[3] "Blood pressure" "Skin Thickness"

[5] " Insulin" "Body Mass Index"

[7] "Diabetes Pedigree Function" "Age"

[9] "Class"

**b) Class-0 is attached with Healthy, Class-1 is attached with Diabetes. Check whether Body Mass Index is having a significant effect on Diabetes. Justify with statistical evidence**.

y1<-table(y$`Body Mass Index`,y$Class)

y2<-y$`Body Mass Index`[y$Class=="0"]

y3<-y$`Body Mass Index`[y$Class=="1"]

t.test(y2,y3,alternative = 't',conf.level = 0.95)

**OUTPUT:-**

Welch Two Sample t-test

data: y2 and y3

t = -8.6193, df = 573.47, p-value < 2.2e-16

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-5.940864 -3.735811

sample estimates:

mean of x mean of y

30.30420 35.14254

**c)Also, check whether ‘Age’, factor affecting the Disease, justify with suitable test.**

y4<-y$Age[y$Class=="1"]

y4

**OUTPUT:-**

[1] 50 32 33 26 53 54 34 59 51 32 31 31 32 41 29 51 41 43 28 46 27 56

[23] 54 25 31 58 41 39 42 38 28 42 26 37 43 60 31 33 24 24 46 39 61 38

[45] 25 23 26 40 62 33 33 30 42 42 43 36 47 32 41 36 29 36 26 37 41 60

[67] 33 31 25 36 40 29 23 26 29 57 52 41 24 36 38 25 32 41 21 66 24 22

[89] 46 26 51 23 32 22 33 49 44 21 51 27 35 25 28 38 29 28 47 52 29 25

[111] 31 24 29 46 30 25 28 47 25 30 27 43 29 59 25 36 43 30 23 41 44 33

[133] 41 37 49 28 44 29 29 67 29 45 25 58 32 35 45 58 27 31 22 25 31 35

[155] 41 46 39 28 21 22 37 28 36 31 38 43 29 41 33 30 25 22 23 38 51 38

[177] 29 35 31 24 45 55 41 35 46 28 53 45 23 32 43 27 56 37 53 54 28 33

[199] 21 62 21 52 41 52 45 44 22 38 54 36 22 36 40 50 50 24 34 38 32 50

[221] 33 22 42 25 27 22 43 40 40 70 40 31 53 25 26 27 46 44 43 43 31 49

[243] 52 30 45 23 38 34 31 52 42 34 22 24 42 48 45 27 36 50 22 26 45 37

[265] 52 66 43 47

t.test(y4,y5,alternative = 't',conf.level = 0.95)

**OUTPUT:-**

Welch Two Sample t-test

data: y4 and y5

t = 6.9207, df = 575.78, p-value = 1.202e-11

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

4.209236 7.545092

sample estimates:

mean of x mean of y

37.06716 31.19000

**5)For the given quantitative samples, compute the following. [8 Marks]**

**#a) First Quartile**

**#b) Third Quartile**

**#c) Inter Quartile Range (IQR)**

**#d) Inner fence**

**#e) Outer fence**

data<-c(34,67,40,72,37,33,42,62,49,32,52,40,31,19,68,55,57,54,37,32,54,38,20,50,56,48,35,52,29,56,68,65,45,44,54,39,29,56,43,42)

res<-summary(data)

quantile(data) # Finding the quantiles

iqr <- res[5] - res[2] # Finding the iqr.

iqr

inner <- res[5] + 1.5\*iqr # Finding the inner fences.

inner

outer <- res[5] + 3 \* iqr # Finding the outer layer.

outer

**OUTPUT:-**

a)36.50

b)55.25

c)18.75

d)83.375

e)111.5

data

[1] 34 67 40 72 37 33 42 62 49 32 52 40 31 19 68 55 57 54 37 32 54 38

[23] 20 50 56 48 35 52 29 56 68 65 45 44 54 39 29 56 43 42

> res<-summary(data)

> res

Min. 1st Qu. Median Mean 3rd Qu. Max.

19.00 36.50 44.50 45.90 55.25 72.00

> quantile(data)

0% 25% 50% 75% 100%

19.00 36.50 44.50 55.25 72.00

> iqr <- res[5] - res[2] # Finding the iqr.

> iqr

3rd Qu.

18.75

> inner <- res[5] + 1.5\*iqr # Finding the inner fences.

> inner

3rd Qu.

83.375

> outer <- res[5] + 3 \* iqr # Finding the outer layer.

> outer

3rd Qu.

111.5

**3)Load the ‘survey’ data set from MASS library and test whether the students smoking habit is independent of their exercise level.**

library(MASS)

data(survey)

a<-survey

a

View(a)

head(a)

str(a)

dim(a)

names(a)

a<-table(a$Smoke,a$Exer)

table<-chisq.test(a)

**OUTPUT:-**

Pearson's Chi-squared test

data: a

X-squared = 5.4885, df = 6, p-value = 0.4828

**4) Load the ‘Cars93’ data set from MASS library and verify the following [5 Marks]**

1. **Considering the ‘Price’ attribute, check whether the mean price of the car significantly vary with respect to ‘Air Bags’. Justify your answer with suitable hypothesis test.**
2. **Also check the mean mileage of the car, vary significantly with respect to ‘Drive Train’.**

library(MASS)

data(Cars93)

b<-Cars93

b

colnames(b)

head(b)

View(b)

**a)** b1<-(b$Price)

b2<-tapply(b$Price,b$AirBags,mean)

summary(b2)

#ANOVA TEST

b3<-aov(b$Price~b$AirBags)

b3

**OUTPUT**:-

aov(formula = b$Price ~ b$AirBags)

Terms:

b$AirBags Residuals

Sum of Squares 2746.984 5837.037

Deg. of Freedom 2 90

Residual standard error: 8.05332

Estimated effects may be unbalanced

Summary(b3)

**Output:-**

Df Sum Sq Mean Sq F value Pr(>F)

b$AirBags 2 2747 1373.5 21.18 2.9e-08 \*\*\*

Residuals 90 5837 64.9

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**b)** **Also check the mean mileage of the car, vary significantly with respect to ‘Drive Train’**

b4<-tapply(b$MPG.city,b$DriveTrain,mean)

**OUTPUT:-**

b4

4WD Front Rear

20.50000 23.52239 18.68750

**10)Load HR.txt data and verify the following with suitable hypothesis test [10 Marks]**

**a)** Attrition is having dependency with Gender

#c)

m1<-f$MonthlyIncome[f$Gender== c("1","2")]

m2<-f$MonthlyIncome[f$Attrition==c("Yes")]

mean(m1)

mean(m2)

m3<-mean(m1)-mean(m2)

m3

str(f)

pooled\_sd<-sqrt(m3)

power.t.test(n=1470,delta = m3,sd=pooled\_sd,sig.level = 0.05)