

# R Notebook

```
df <- readRDS("../Data/MentalHealthCLEAN.rds")
```

I am going to drop state from the dataset as more than 50% of the data is not populated and comments because it is a raw text field

```
df = df[,!(names(df) %in% c("state", "comments"))]
```

```
model1 <- glm(seek_help ~ ., data = df, family = binomial)
summary(model1)
```

```
##
## Call:
## glm(formula = seek_help ~ ., family = binomial, data = df)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.7505  -0.5008   0.3273   0.6378   2.3447
##
## Coefficients: (4 not defined because of singularities)
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -4.963e+01  3.093e+01  -1.604  0.10862
## Timestamp       3.409e-08  2.194e-08   1.554  0.12019
## Age            1.979e-02  1.177e-02   1.682  0.09261
## Genderfemale_trans  1.612e+01  1.571e+03   0.010  0.99181
## Genderfluid     -1.729e-01  1.266e+00  -0.137  0.89132
## Gendergenderqueer  3.977e-01  9.942e-01   0.400  0.68912
## Gendermale_cis   -1.562e-01  2.129e-01  -0.734  0.46309
## Genderunknown    1.553e+01  3.956e+03   0.004  0.99687
## CountryAustria   -8.131e-01  1.668e+00  -0.488  0.62589
## CountryBelgium    1.505e+01  1.529e+03   0.010  0.99214
## CountryBosnia and Herzegovina -1.739e+01  3.956e+03  -0.004  0.99649
## CountryBrazil     1.505e+01  1.428e+03   0.011  0.99159
## CountryBulgaria   1.470e+01  2.270e+03   0.006  0.99483
## CountryCanada    -7.051e-01  8.724e-01  -0.808  0.41894
## CountryChina      1.407e+01  3.956e+03   0.004  0.99716
## CountryColombia   1.344e+01  2.710e+03   0.005  0.99604
## CountryCosta Rica  1.243e+01  3.956e+03   0.003  0.99749
## CountryCroatia    -3.830e+00  2.075e+00  -1.846  0.06490
## CountryCzech Republic  1.334e+01  3.956e+03   0.003  0.99731
## CountryDenmark    1.389e+01  2.797e+03   0.005  0.99604
## CountryFinland    -1.296e+00  2.468e+00  -0.525  0.59961
## CountryFrance     1.309e-01  1.212e+00   0.108  0.91400
## CountryGeorgia    1.272e+01  3.956e+03   0.003  0.99744
## CountryGermany    2.012e-01  9.421e-01   0.214  0.83088
## CountryGreece     1.376e+01  2.794e+03   0.005  0.99607
## CountryHungary    1.239e+01  3.956e+03   0.003  0.99750
## CountryIndia       7.551e-01  1.242e+00   0.608  0.54320
## CountryIreland    -9.714e-02  1.114e+00  -0.087  0.93049
## CountryIsrael     1.259e-01  1.799e+00   0.070  0.94424
## CountryItaly      -8.621e-01  1.286e+00  -0.670  0.50263
## CountryJapan      1.253e+01  3.956e+03   0.003  0.99747
## CountryLatvia     1.427e+01  3.956e+03   0.004  0.99712
```

|                                 |            |           |        |              |
|---------------------------------|------------|-----------|--------|--------------|
| ## CountryMexico                | -7.379e-01 | 1.671e+00 | -0.442 | 0.65877      |
| ## CountryMoldova               | 1.205e+01  | 3.956e+03 | 0.003  | 0.99757      |
| ## CountryNetherlands           | -1.116e+00 | 9.503e-01 | -1.175 | 0.24018      |
| ## CountryNew Zealand           | 1.557e+01  | 1.137e+03 | 0.014  | 0.98907      |
| ## CountryNigeria               | 1.387e+01  | 3.956e+03 | 0.004  | 0.99720      |
| ## CountryNorway                | 1.553e+01  | 3.956e+03 | 0.004  | 0.99687      |
| ## CountryPhilippines           | 1.361e+01  | 3.956e+03 | 0.003  | 0.99726      |
| ## CountryPoland                | 1.537e+01  | 1.247e+03 | 0.012  | 0.99017      |
| ## CountryPortugal              | 1.438e+01  | 2.792e+03 | 0.005  | 0.99589      |
| ## CountryRomania               | 1.485e+01  | 3.956e+03 | 0.004  | 0.99701      |
| ## CountryRussia                | -2.264e+00 | 1.551e+00 | -1.459 | 0.14449      |
| ## CountrySingapore             | -5.450e-01 | 1.544e+00 | -0.353 | 0.72409      |
| ## CountrySlovenia              | 1.559e+01  | 3.956e+03 | 0.004  | 0.99686      |
| ## CountrySouth Africa          | 1.383e+01  | 1.465e+03 | 0.009  | 0.99247      |
| ## CountrySpain                 | 1.573e+01  | 3.956e+03 | 0.004  | 0.99683      |
| ## CountrySweden                | -7.338e-01 | 1.307e+00 | -0.561 | 0.57466      |
| ## CountrySwitzerland           | 1.510e+01  | 1.364e+03 | 0.011  | 0.99116      |
| ## CountryThailand              | 1.447e+01  | 3.956e+03 | 0.004  | 0.99708      |
| ## CountryUnited Kingdom        | -5.150e-01 | 8.211e-01 | -0.627 | 0.53057      |
| ## CountryUnited States         | -9.035e-01 | 8.058e-01 | -1.121 | 0.26213      |
| ## CountryUruguay               | 1.815e+01  | 3.956e+03 | 0.005  | 0.99634      |
| ## self_employedYes             | -2.753e-01 | 3.922e-01 | -0.702 | 0.48270      |
| ## family_historyYes            | -7.060e-02 | 1.820e-01 | -0.388 | 0.69805      |
| ## treatmentYes                 | -6.837e-01 | 2.412e-01 | -2.835 | 0.00459 **   |
| ## work_interfereNo Response    | 1.500e-01  | 2.587e-01 | 0.580  | 0.56209      |
| ## work_interfereOften          | 7.312e-01  | 3.718e-01 | 1.966  | 0.04925 *    |
| ## work_interfereRarely         | 5.426e-01  | 3.159e-01 | 1.718  | 0.08583 .    |
| ## work_interfereSometimes      | 5.354e-01  | 2.727e-01 | 1.963  | 0.04963 *    |
| ## no_employees100-500          | -6.795e-01 | 4.260e-01 | -1.595 | 0.11070      |
| ## no_employees26-100           | -4.804e-01 | 4.045e-01 | -1.188 | 0.23496      |
| ## no_employees500-1000         | -1.099e+00 | 5.078e-01 | -2.164 | 0.03043 *    |
| ## no_employees6-25             | -2.393e-01 | 3.922e-01 | -0.610 | 0.54180      |
| ## no_employeesMore than 1000   | -8.951e-01 | 4.247e-01 | -2.108 | 0.03505 *    |
| ## remote_workYes               | -2.185e-01 | 1.947e-01 | -1.122 | 0.26171      |
| ## tech_companyYes              | 1.561e-01  | 2.176e-01 | 0.717  | 0.47315      |
| ## benefitsNo                   | 1.684e+00  | 2.888e-01 | 5.829  | 5.56e-09 *** |
| ## benefitsYes                  | 8.670e-01  | 2.297e-01 | 3.775  | 0.00016 ***  |
| ## care_optionsNot sure         | -4.294e-01 | 1.975e-01 | -2.174 | 0.02974 *    |
| ## care_optionsYes              | 2.698e-01  | 2.488e-01 | 1.085  | 0.27805      |
| ## wellness_programNo           | 1.800e+00  | 2.430e-01 | 7.410  | 1.27e-13 *** |
| ## wellness_programYes          | 2.003e+00  | 2.931e-01 | 6.832  | 8.35e-12 *** |
| ## anonymityNo                  | 1.196e+00  | 7.074e-01 | 1.691  | 0.09079 .    |
| ## anonymityYes                 | 9.175e-01  | 2.285e-01 | 4.015  | 5.95e-05 *** |
| ## leaveSomewhat difficult      | 6.819e-01  | 3.369e-01 | 2.024  | 0.04300 *    |
| ## leaveSomewhat easy           | 3.878e-01  | 2.253e-01 | 1.721  | 0.08519 .    |
| ## leaveVery difficult          | 1.011e+00  | 4.557e-01 | 2.217  | 0.02659 *    |
| ## leaveVery easy               | -6.539e-02 | 2.593e-01 | -0.252 | 0.80093      |
| ## mental_health_consequenceNo  | 3.824e-02  | 2.313e-01 | 0.165  | 0.86868      |
| ## mental_health_consequenceYes | -1.432e-01 | 2.494e-01 | -0.574 | 0.56589      |
| ## phys_health_consequenceNo    | -1.678e-01 | 2.242e-01 | -0.748 | 0.45419      |
| ## phys_health_consequenceYes   | 8.542e-01  | 5.353e-01 | 1.596  | 0.11055      |
| ## coworkersSome of them        | 3.211e-01  | 2.351e-01 | 1.366  | 0.17196      |
| ## coworkersYes                 | 7.569e-01  | 3.394e-01 | 2.230  | 0.02576 *    |
| ## supervisorSome of them       | -1.708e-01 | 2.344e-01 | -0.729 | 0.46626      |

```

## supervisorYes          -4.361e-02  2.660e-01  -0.164  0.86976
## mental_health_interviewNo  2.625e-01  2.653e-01   0.990  0.32241
## mental_health_interviewYes  1.619e-01  5.780e-01   0.280  0.77945
## phys_health_interviewNo    9.062e-02  1.905e-01   0.476  0.63427
## phys_health_interviewYes    5.836e-01  2.765e-01   2.111  0.03481 *
## mental_vs_physicalNo       2.956e-01  2.247e-01   1.316  0.18826
## mental_vs_physicalYes      -7.803e-02  2.283e-01  -0.342  0.73245
## obs_consequenceYes         3.676e-01  2.935e-01   1.252  0.21042
## continentAmericas          NA          NA          NA          NA
## continentAsia              NA          NA          NA          NA
## continentEurope            NA          NA          NA          NA
## continentOceania           NA          NA          NA          NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 1480.28  on 1232  degrees of freedom
## Residual deviance:  995.82  on 1139  degrees of freedom
## AIC: 1183.8
##
## Number of Fisher Scoring iterations: 16
model2 <- glm(seek_help~benefits+wellness_program+treatment+anonymity+work_interfere+ care_options+ leave+coworkers+phys_health_interview, family = binomial, data = df)
summary(model2)

##
## Call:
## glm(formula = seek_help ~ benefits + wellness_program + treatment +
##      anonymity + work_interfere + care_options + leave + coworkers +
##      phys_health_interview, family = binomial, data = df)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.8273  -0.5396   0.3704   0.6596   2.3228
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -2.21180    0.34740  -6.367 1.93e-10 ***
## benefitsNo       1.94943    0.26086   7.473 7.83e-14 ***
## benefitsYes      0.56357    0.20825   2.706  0.00680 **
## wellness_programNo 1.92522    0.22007   8.748 < 2e-16 ***
## wellness_programYes 2.02681    0.27301   7.424 1.14e-13 ***
## treatmentYes     -0.60325    0.22293  -2.706  0.00681 **
## anonymityNo      1.50135    0.65995   2.275  0.02291 *
## anonymityYes      0.87835    0.21534   4.079 4.53e-05 ***
## work_interfereNo Response 0.13039    0.24201   0.539  0.59003
## work_interfereOften  0.80986    0.34729   2.332  0.01970 *
## work_interfereRarely  0.50222    0.29865   1.682  0.09264 .
## work_interfereSometimes 0.49488    0.25574   1.935  0.05298 .
## care_optionsNot sure  -0.41616    0.18615  -2.236  0.02538 *
## care_optionsYes     0.30513    0.23801   1.282  0.19983
## leaveSomewhat difficult 0.81722    0.31696   2.578  0.00993 **
## leaveSomewhat easy    0.42202    0.21033   2.007  0.04480 *
## leaveVery difficult    1.12097    0.42462   2.640  0.00829 **

```

```

## leaveVery easy          -0.05335    0.23368   -0.228   0.81942
## coworkersSome of them    0.28150    0.19407    1.451   0.14691
## coworkersYes             0.66841    0.27335    2.445   0.01448 *
## phys_health_interviewNo  0.13567    0.16686    0.813   0.41619
## phys_health_interviewYes 0.60311    0.24333    2.479   0.01319 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 1480.3  on 1232  degrees of freedom
## Residual deviance: 1061.2  on 1211  degrees of freedom
## AIC: 1105.2
##
## Number of Fisher Scoring iterations: 6
model3 <- glm(seek_help~benefits+wellness_program+anonymity + leave, data =df, family=binomial )
summary(model3)

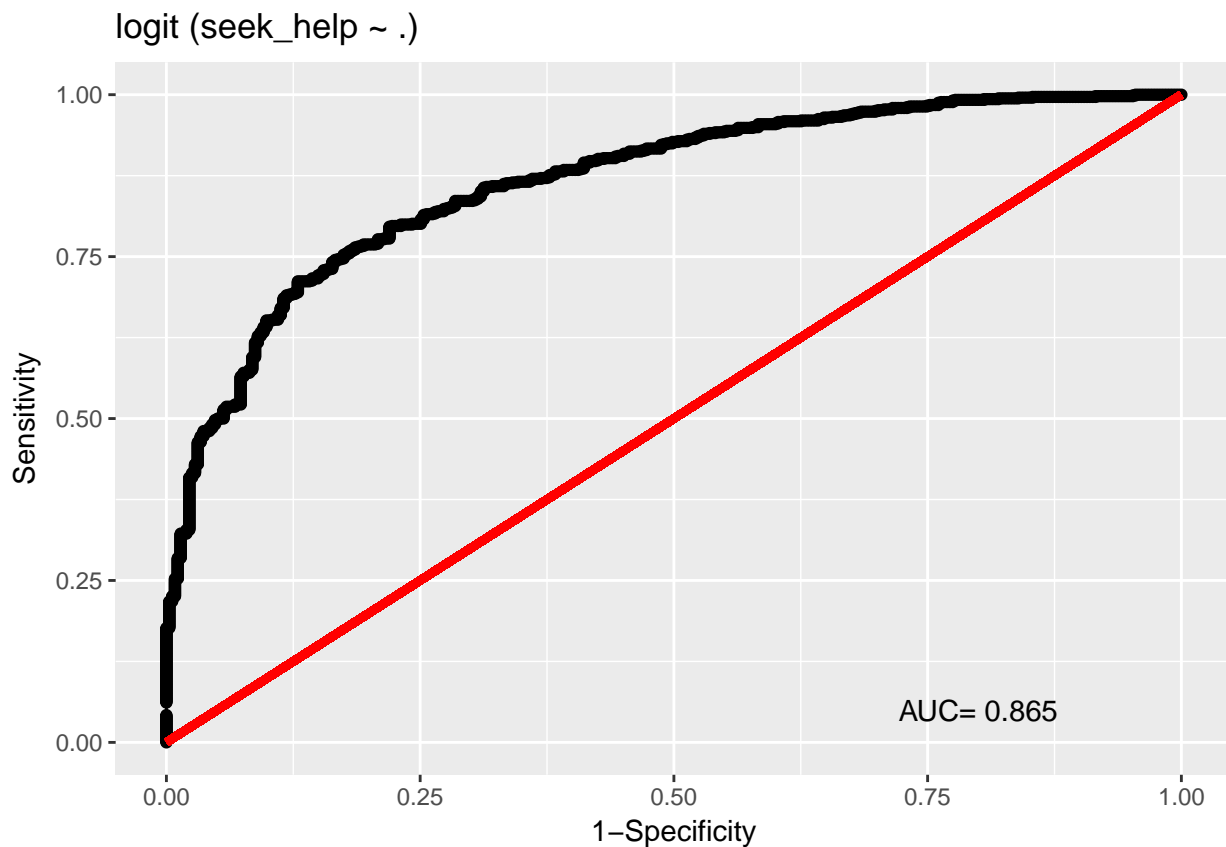
##
## Call:
## glm(formula = seek_help ~ benefits + wellness_program + anonymity +
##      leave, family = binomial, data = df)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.7704  -0.5193   0.4200   0.7156   2.0349
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -1.93569    0.21756  -8.897 < 2e-16 ***
## benefitsNo       2.15167    0.24972   8.616 < 2e-16 ***
## benefitsYes      0.68224    0.17763   3.841 0.000123 ***
## wellness_programNo 1.95218    0.20956   9.316 < 2e-16 ***
## wellness_programYes 2.07974    0.26292   7.910 2.57e-15 ***
## anonymityNo      1.64751    0.66365   2.482 0.013047 *
## anonymityYes     0.96864    0.20394   4.750 2.04e-06 ***
## leaveSomewhat difficult 0.67800    0.30513   2.222 0.026284 *
## leaveSomewhat easy    0.53296    0.20326   2.622 0.008742 **
## leaveVery difficult   1.01096    0.40707   2.483 0.013010 *
## leaveVery easy       0.08822    0.22471   0.393 0.694625
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 1480.3  on 1232  degrees of freedom
## Residual deviance: 1093.3  on 1222  degrees of freedom
## AIC: 1115.3
##
## Number of Fisher Scoring iterations: 6
library(Deducer)

## Loading required package: ggplot2

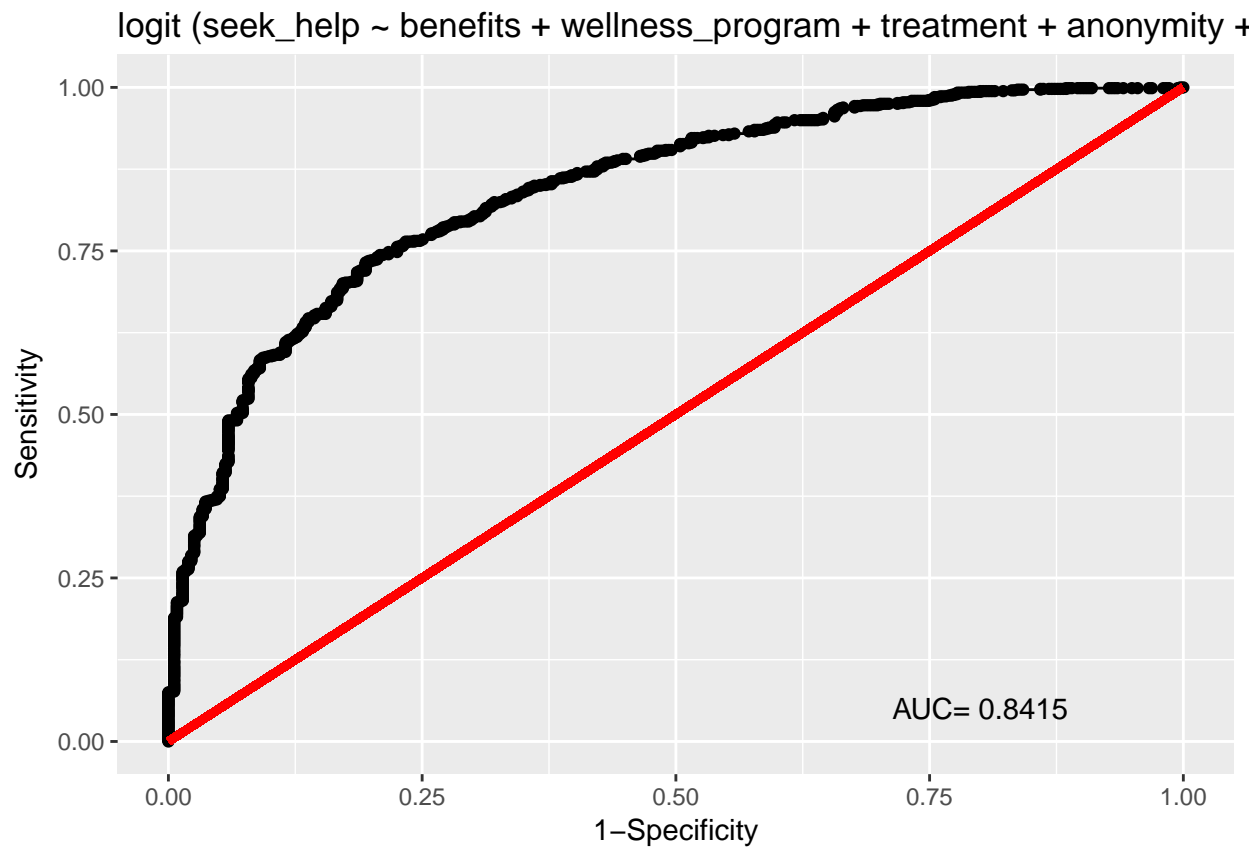
```

```
## Loading required package: JGR
## Loading required package: rJava
## Loading required package: JavaGD
##
## Please type JGR() to launch console. Platform specific launchers (.exe and .app) can also be obtained
## Loading required package: car
## Loading required package: MASS
##
##
## Note Non-JGR console detected:
## Deducer is best used from within JGR (http://jgr.markushelbig.org/).
## To Bring up GUI dialogs, type deducer().
```

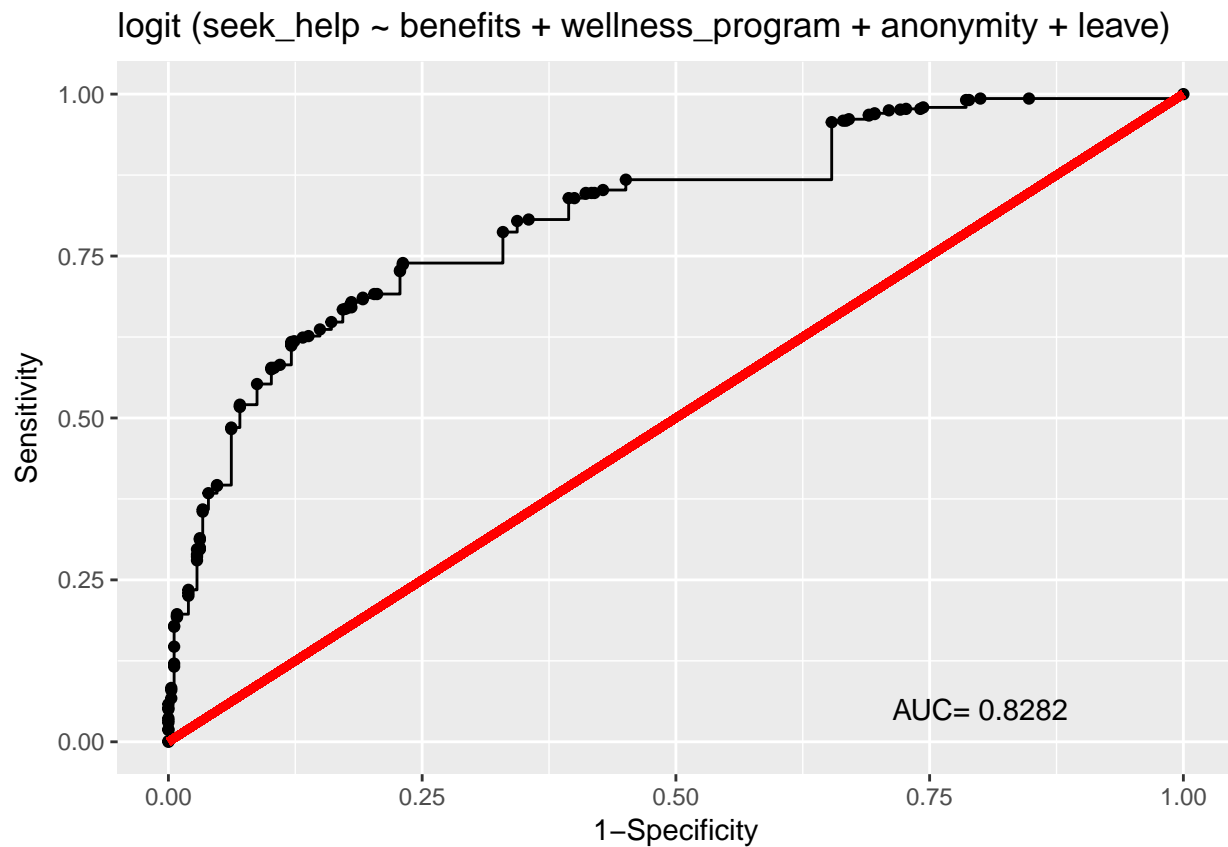
```
rocplot(model1)
```



```
rocplot(model2)
```



```
rocplot(model3)
```



Not Surprising the most important variables are if someone is going to seek help is if they no the benefits, there is a wellness program at work, they can state anonymous and leave is fairly easy.