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title: "Multiple Binary Logistic Regression"  

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date: "December 26, 2025"  

output:  

  pdf_document:  

    number_sections: true  

    toc: true  

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    geometry: margin=1in  

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```

This markdown file utilizes multiple binary logistic regression, using “rejected” as the reference variable

Estimate odds ratio and 95% confidence interval for predictor variables, relative to the reference variable (“Rejected”)

```

# Example: Multiple Binary Logistic Regression  

ucb$Admit=relevel(ucb$Admit, ref = "Rejected")  

model = glm(Admit ~ Gender + Dept, family = binomial, data = ucb, weights = Freq)  

summary(model)

##  

## Call:  

## glm(formula = Admit ~ Gender + Dept, family = binomial, data = ucb,  

##       weights = Freq)  

##  

## Coefficients:  

##              Estimate Std. Error z value Pr(>|z|)  

## (Intercept)  0.58205   0.06899   8.436  <2e-16 ***  

## GenderFemale 0.09987   0.08085   1.235   0.217  

## DeptB        -0.04340   0.10984  -0.395   0.693  

## DeptC        -1.26260   0.10663 -11.841  <2e-16 ***  

## DeptD        -1.29461   0.10582 -12.234  <2e-16 ***  

## DeptE        -1.73931   0.12611 -13.792  <2e-16 ***  

## DeptF        -3.30648   0.16998 -19.452  <2e-16 ***  

## ---  

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  

##  

## (Dispersion parameter for binomial family taken to be 1)  

##  

## Null deviance: 6044.3  on 23  degrees of freedom  

## Residual deviance: 5187.5  on 17  degrees of freedom  

## AIC: 5201.5  

##  

## Number of Fisher Scoring iterations: 6

exp(cbind(OR = coef(model), confint.default(model)))

```

```

##          OR      2.5 %    97.5 %
## (Intercept) 1.78970606 1.56334599 2.04884127
## GenderFemale 1.10502735 0.94309706 1.29476116
## DeptB        0.95753028 0.77207142 1.18753812
## DeptC        0.28291804 0.22955913 0.34867975
## DeptD        0.27400567 0.22268066 0.33716044
## DeptE        0.17564230 0.13717694 0.22489361
## DeptF        0.03664494 0.02626184 0.05113317

```

We see that GenderFemale and Dept B do not appear to be significant predictors, as 1 lies within their confidence intervals, which indicates they are not statistically significant. Their odds ratios are near 1, which means these have a small effect

```

ucb$pred_prob = predict(model, type = "response")
head(ucb)

```

```

##      Admit Gender Dept Freq pred_prob
## 1 Admitted   Male    A  512 0.6415393
## 2 Rejected   Male    A  313 0.6415393
## 3 Admitted Female   A   89 0.6641674
## 4 Rejected Female   A   19 0.6641674
## 5 Admitted   Male    B  353 0.6314991
## 6 Rejected   Male    B  207 0.6314991

```