**Some Important Output**

##Exercise 2 OLS

#1 Correlation

# X1

# Y 0.48255

#very different from 1.2

#2 OLS

sd\_ols

# sd\_intercept sd\_X1 sd\_X2 sd\_X3

# sd\_ols 0.09059376 0.03886719 0.02620884 0.04865813

#3 Bootstrap

sd\_boot1

# sd\_intercept sd\_X1 sd\_X2 sd\_X3

# sd\_bootstrap1 0.03446696 0.01394711 0.009132332 0.02005987

sd\_boot2

# sd\_intercept sd\_X1 sd\_X2 sd\_X3

# sd\_bootstrap2 0.04065694 0.01743631 0.01129683 0.02181165

##Exercise 3 Numerical Optimization

#diffenrence between true parameters

#the true b is (0.5,1.2,-0.9,0.1)

#the estimate by numerical optimization is

# beta\_probit

# intercept -1.02462169

# X1 1.17150332

# X2 -0.89387081

# X3 0.05547262

#the coefficients for the intercept and X3 is quite different, but the coefficients for X1 and X3 are quite similar.

##Exercise 4 Discrete Choice

summary(probit)

# Call:

# glm(formula = ydum ~ 0 + X, family = binomial(link = "probit"))

#

# Deviance Residuals:

# Min 1Q Median 3Q Max

# -2.7789 -0.8262 0.2237 0.7970 3.0566

#

# Coefficients:

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

# Xintercept -1.10247 0.05702 -19.333 <2e-16 \*\*\*

# XX1 1.20363 0.02773 43.410 <2e-16 \*\*\*

# XX2 -0.88850 0.02147 -41.386 <2e-16 \*\*\*

# XX3 0.06301 0.03146 2.003 0.0452 \*

# ---

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

#

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

#

# Null deviance: 13862.9 on 10000 degrees of freedom

# Residual deviance: 9873.2 on 9996 degrees of freedom

# AIC: 9881.2

#

# Number of Fisher Scoring iterations: 5

## Interpretation

#if X1 increase, the probability of y success is likely to increase.

#if X2 increase, the probability of y success is likely to decrease.

#if X3 increase, the probability of y success is likely to increase.

#the influence of X1 on y and the influence of X2 on y are significant at high significance level.

summary(logit)

# Call:

# glm(formula = ydum ~ 0 + X, family = binomial(link = "logit"))

#

# Deviance Residuals:

# Min 1Q Median 3Q Max

# -2.6399 -0.8082 0.2643 0.7833 2.8365

#

# Coefficients:

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

# Xintercept -1.85821 0.09679 -19.198 <2e-16 \*\*\*

# XX1 2.04048 0.04979 40.978 <2e-16 \*\*\*

# XX2 -1.51703 0.03891 -38.992 <2e-16 \*\*\*

# XX3 0.10534 0.05368 1.962 0.0497 \*

# ---

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

#

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

#

# Null deviance: 13862.9 on 10000 degrees of freedom

# Residual deviance: 9877.4 on 9996 degrees of freedom

# AIC: 9885.4

#

# Number of Fisher Scoring iterations: 5

## Interpretation

#if X1 increase, the probability of y success is likely to increase.

#if X2 increase, the probability of y success is likely to decrease.

#if X3 increase, the probability of y success is likely to increase.

#the influence of X1 on y and the influence of X2 on y are significant at high significance level.

summary(lp)

# Call:

# lm(formula = ydum ~ 0 + X)

#

# Residuals:

# Min 1Q Median 3Q Max

# -1.07859 -0.34971 0.04563 0.32746 1.16292

#

# Coefficients:

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

# Xintercept 0.140463 0.016574 8.475 <2e-16 \*\*\*

# XX1 0.356645 0.007111 50.156 <2e-16 \*\*\*

# XX2 -0.234403 0.004795 -48.886 <2e-16 \*\*\*

# XX3 0.016670 0.008902 1.873 0.0612 .

# ---

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

#

# Residual standard error: 0.4102 on 9996 degrees of freedom

# Multiple R-squared: 0.6693, Adjusted R-squared: 0.6691

# F-statistic: 5057 on 4 and 9996 DF, p-value: < 2.2e-16

## Interpretation

#if X1 increase 1 unit, the probability of y success is likely to increase 0.356645, holding other xi fixed.

#if X2 increase 1 unit, the probability of y success is likely to decrease 0.234403, holding other xi fixed.

#the difference in probability of success when x3=1 and x3=0 is 0.016670, holding other xi fixed.

#the influence of X1 on y and the influence of X2 on y are significant at high significance level.

#Exercise 5

#Calculate marginal effect of probit model （average level)

# marginal\_effects\_probit

# intercept -0.43981871

# X1 0.48017560

# X2 -0.35445764

# X3 0.02513593

#Calculate marginal effect of logit model (average level)

# beta\_logit

# intercept -0.46453397

# X1 0.51009822

# X2 -0.37924242

# X3 0.02633436

#Calculate probit standard deviations of marginal effects using the delta method

# sd\_intercept sd\_X1 sd\_X2 sd\_X3

# sd\_mfx\_probit\_delta 0.01529291 0.009076889 0.006987629 0.008757372

#Calculate logit standard deviations of marginal effects using the delta method

# sd\_intercept sd\_X1 sd\_X2 sd\_X3

# sd\_mfx\_logit\_delta 0.0156721 0.01158203 0.008829848 0.008778209

#Calculate probit standard deviations of marginal effects using bootstrap (average level)

# sd\_X1 sd\_X2 sd\_X3

# sd\_mfx\_probit\_bootstrap 0.01127554 0.008665574 0.01199452

#Calculate logit standard deviations of marginal effects using bootstrap (average level)

# sd\_X1 sd\_X2 sd\_X3

# sd\_mfx\_logit\_bootstrap 0.0116747 0.009049812 0.01337763