# Attributes for both student-mat.csv (Math course) and student-por.csv (Portuguese language course) datasets:

1 school - student's school (binary: "GP" - Gabriel Pereira or "MS" - Mousinho da Silveira)

2 sex - student's sex (binary: "F" - female or "M" - male)

3 age - student's age (numeric: from 15 to 22)

4 address - student's home address type (binary: "U" - urban or "R" - rural)

5 famsize - family size (binary: "LE3" - less or equal to 3 or "GT3" - greater than 3)

6 Pstatus - parent's cohabitation status (binary: "T" - living together or "A" - apart)

7 Medu - mother's education (numeric: 0 - none, 1 - primary education (4th grade), 2 – 5th to 9th grade, 3 – secondary education or 4 – higher education)

8 Fedu - father's education (numeric: 0 - none, 1 - primary education (4th grade), 2 – 5th to 9th grade, 3 – secondary education or 4 – higher education)

9 Mjob - mother's job (nominal: "teacher", "health" care related, civil "services" (e.g. administrative or police), "at\_home" or "other")

~~10 Fjob - father's job (nominal: "teacher", "health" care related, civil "services" (e.g. administrative or police), "at\_home" or "other")~~

11 reason - reason to choose this school (nominal: close to "home", school "reputation", "course" preference or "other")

12 guardian - student's guardian (nominal: "mother", "father" or "other")

13 traveltime - home to school travel time (numeric: 1 - <15 min., 2 - 15 to 30 min., 3 - 30 min. to 1 hour, or 4 - >1 hour)

14 studytime - weekly study time (numeric: 1 - <2 hours, 2 - 2 to 5 hours, 3 - 5 to 10 hours, or 4 - >10 hours)

15 failures - number of past class failures (numeric: n if 1<=n<3,,14 else 4)

16 schoolsup - extra educational support (binary: yes or no)

17 famsup - family educational support (binary: yes or no)

18 paid - extra paid classes within the course subject (Math or Portuguese) (binary: yes or no)

19 activities - extra-curricular activities (binary: yes or no)

20 nursery - attended nursery school (binary: yes or no)

21 higher - wants to take higher education (binary: yes or no)

22 internet - Internet access at home (binary: yes or no)

23 romantic - with a romantic relationship (binary: yes or no)

24 famrel - quality of family relationships (numeric: from 1 - very bad to 5 - excellent)

~~25 freetime - free time after school (numeric: from 1 - very low to 5 - very high)~~

26 goout - going out with friends (numeric: from 1 - very low to 5 - very high)

27 Dalc - workday alcohol consumption (numeric: from 1 - very low to 5 - very high)

28 Walc - weekend alcohol consumption (numeric: from 1 - very low to 5 - very high)

29 health - current health status (numeric: from 1 - very bad to 5 - very good)

30 absences - number of school absences (numeric: from 0 to 93)

# these grades are related with the course subject, Math or Portuguese:

31 G1 - first period grade (numeric: from 0 to 20)

31 G2 - second period grade (numeric: from 0 to 20)

32 G3 - final grade (numeric: from 0 to 20, output target)

Additional note: there are several (382) students that belong to both datasets .

These students can be identified by searching for identical attributes

that characterize each student, as shown in the annexed R file.

Call:

lm(formula = G3 ~ ., data = train)

Residuals:

Min 1Q Median 3Q Max

-10.4189 -2.0065 0.2941 2.1717 8.6864

Coefficients:

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

(Intercept) 17.26651 8.97415 1.924 0.05654 .

schoolMS 1.78504 1.43613 1.243 0.21612

sexM 0.42424 0.82878 0.512 0.60960

addressU 0.97837 0.98044 0.998 0.32019

famsizeLE3 1.15105 0.89787 1.282 0.20213

PstatusT -0.54424 1.24788 -0.436 0.66347

Medu1 -4.17432 3.83223 -1.089 0.27805

Medu2 -4.36888 3.93295 -1.111 0.26869

Medu3 -4.16178 3.91575 -1.063 0.28983

Medu4 -2.97161 4.22945 -0.703 0.48356

Fedu2 -1.58048 1.12683 -1.403 0.16312

Fedu3 -0.50888 1.23796 -0.411 0.68170

Fedu4 -1.15520 1.40216 -0.824 0.41152

Mjobhealth 2.19697 1.95673 1.123 0.26360

Mjobother 0.57098 1.16448 0.490 0.62473

Mjobservices 3.15232 1.39149 2.265 0.02514 \*

Mjobteacher 1.05441 1.85117 0.570 0.56994

Fjobhealth -0.79537 3.01349 -0.264 0.79225

Fjobother -0.26083 2.16810 -0.120 0.90443

Fjobservices -1.37046 2.20198 -0.622 0.53478

Fjobteacher 0.45591 2.64887 0.172 0.86362

reasonhome -1.49049 0.99474 -1.498 0.13646

reasonother -0.25958 1.27270 -0.204 0.83870

reasonreputation 0.24645 1.03047 0.239 0.81136

guardianmother -0.37468 0.93813 -0.399 0.69027

guardianother 1.00279 1.75998 0.570 0.56981

traveltime2 -0.36860 0.91572 -0.403 0.68796

traveltime3 0.10405 2.02923 0.051 0.95918

traveltime4 -2.50349 2.60771 -0.960 0.33882

studytime2 1.18822 0.94568 1.256 0.21120

studytime3 3.43061 1.25586 2.732 0.00718 \*\*

studytime4 2.81055 1.73028 1.624 0.10673

failures1 -2.11072 1.14881 -1.837 0.06845 .

failures2 -3.08302 1.84055 -1.675 0.09633 .

failures3 -3.56304 1.83747 -1.939 0.05466 .

schoolsupyes -0.26453 1.07021 -0.247 0.80517

famsupyes -0.37790 0.83462 -0.453 0.65146

paidyes -0.50993 0.84399 -0.604 0.54677

activitiesyes -0.78943 0.77221 -1.022 0.30854

nurseryyes -0.34524 0.89789 -0.384 0.70124

higheryes 1.47112 1.63505 0.900 0.36992

internetyes 0.50680 1.03208 0.491 0.62422

romanticyes -1.87485 0.77417 -2.422 0.01683 \*

famrel2 4.18731 3.36445 1.245 0.21553

famrel3 2.53028 3.07818 0.822 0.41258

famrel4 3.13755 3.12813 1.003 0.31772

famrel5 3.90950 3.09233 1.264 0.20840

freetime2 0.77821 2.22739 0.349 0.72737

freetime3 -1.09879 2.16977 -0.506 0.61343

freetime4 -0.50738 2.16713 -0.234 0.81526

freetime5 0.10435 2.50289 0.042 0.96681

goout2 2.00845 1.80384 1.113 0.26758

goout3 1.62009 1.72685 0.938 0.34990

goout4 0.95609 1.84190 0.519 0.60459

goout5 -0.83417 1.96613 -0.424 0.67207

Dalc2 -1.71608 1.01893 -1.684 0.09454 .

Dalc3 -1.22593 1.99681 -0.614 0.54033

Dalc4 -1.53927 2.47022 -0.623 0.53429

Dalc5 -0.19939 2.76869 -0.072 0.94270

Walc2 0.96157 1.03118 0.932 0.35281

Walc3 1.79106 1.06065 1.689 0.09368 .

Walc4 1.16782 1.54341 0.757 0.45063

Walc5 4.05014 2.18784 1.851 0.06641 .

health2 -0.69534 1.57405 -0.442 0.65940

health3 -0.83275 1.45160 -0.574 0.56718

health4 -0.48080 1.42962 -0.336 0.73718

health5 -0.25579 1.36270 -0.188 0.85140

absences 0.07051 0.04655 1.515 0.13221

age -0.51425 0.36388 -1.413 0.15998

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

Residual standard error: **4.249** on 130 degrees of freedom

Multiple R-squared: **0.4749**, Adjusted R-squared: **0.2002**

F-statistic: 1.729 on 68 and 130 DF, p-value: **0.003885**

Call:

lm(formula = G3 ~ . - freetime, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.4462 -1.9182 0.4315 2.3149 8.4058

Coefficients:

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

(Intercept) 15.46884 8.43744 1.833 0.06897 .

schoolMS 1.63887 1.38933 1.180 0.24024

sexM 0.47177 0.82407 0.572 0.56795

addressU 1.12166 0.96651 1.161 0.24790

famsizeLE3 1.18771 0.89287 1.330 0.18571

PstatusT -0.39946 1.21273 -0.329 0.74237

Medu1 -3.93653 3.80975 -1.033 0.30334

Medu2 -4.19399 3.91286 -1.072 0.28572

Medu3 -4.18467 3.89303 -1.075 0.28435

Medu4 -2.74080 4.18719 -0.655 0.51387

Fedu2 -1.49169 1.06493 -1.401 0.16361

Fedu3 -0.37587 1.19961 -0.313 0.75452

Fedu4 -1.26026 1.39380 -0.904 0.36752

Mjobhealth 2.52392 1.89876 1.329 0.18603

Mjobother 0.69535 1.14459 0.608 0.54454

Mjobservices 3.50144 1.36395 2.567 0.01135 \*

Mjobteacher 1.01232 1.81273 0.558 0.57747

Fjobhealth -0.10767 2.97464 -0.036 0.97118

Fjobother -0.03413 2.14086 -0.016 0.98731

Fjobservices -1.12234 2.16544 -0.518 0.60511

Fjobteacher 1.02836 2.57889 0.399 0.69070

reasonhome -1.70359 0.94509 -1.803 0.07370 .

reasonother -0.44311 1.25815 -0.352 0.72525

reasonreputation 0.04626 0.99732 0.046 0.96308

guardianmother -0.41121 0.92160 -0.446 0.65618

guardianother 1.11389 1.74351 0.639 0.52399

traveltime2 -0.31649 0.90130 -0.351 0.72603

traveltime3 0.35365 1.98768 0.178 0.85905

traveltime4 -2.61215 2.56327 -1.019 0.31001

studytime2 1.05147 0.91697 1.147 0.25356

studytime3 3.36449 1.24396 2.705 0.00773 \*\*

studytime4 3.07811 1.67955 1.833 0.06907 .

failures1 -1.89055 1.13586 -1.664 0.09837 .

failures2 -2.85533 1.82204 -1.567 0.11945

failures3 -3.55335 1.82637 -1.946 0.05380 .

schoolsupyes -0.40298 1.05432 -0.382 0.70291

famsupyes -0.50006 0.82779 -0.604 0.54681

paidyes -0.39914 0.83235 -0.480 0.63234

activitiesyes -0.73765 0.74506 -0.990 0.32393

nurseryyes -0.15798 0.88778 -0.178 0.85903

higheryes 1.73768 1.61204 1.078 0.28300

internetyes 0.25311 1.01404 0.250 0.80327

romanticyes -1.96832 0.76792 -2.563 0.01148 \*

famrel2 3.54759 3.31352 1.071 0.28625

famrel3 1.98767 3.03175 0.656 0.51319

famrel4 2.45002 3.06133 0.800 0.42495

famrel5 3.03615 3.02059 1.005 0.31664

goout2 2.15116 1.77585 1.211 0.22790

goout3 1.67101 1.70299 0.981 0.32825

goout4 1.06718 1.82409 0.585 0.55950

goout5 -0.49862 1.95053 -0.256 0.79863

Dalc2 -1.79778 1.00548 -1.788 0.07604 .

Dalc3 -1.27473 1.95811 -0.651 0.51616

Dalc4 -1.84328 2.42378 -0.760 0.44829

Dalc5 -0.42669 2.68646 -0.159 0.87404

Walc2 1.16177 1.01965 1.139 0.25658

Walc3 1.96336 1.03765 1.892 0.06063 .

Walc4 1.28585 1.53607 0.837 0.40402

Walc5 4.30737 2.14294 2.010 0.04644 \*

health2 -1.09332 1.51019 -0.724 0.47035

health3 -1.11032 1.41050 -0.787 0.43256

health4 -0.87742 1.37757 -0.637 0.52526

health5 -0.53857 1.31331 -0.410 0.68240

absences 0.07193 0.04632 1.553 0.12282

age -0.43912 0.35523 -1.236 0.21857

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

Residual standard error: **4.238** on 134 degrees of freedom

Multiple R-squared: **0.4614**, Adjusted R-squared: **0.2042**

F-statistic: 1.794 on 64 and 134 DF, p-value: **0.002438**

Call:

lm(formula = G3 ~ . - freetime - Fjob, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.5433 -1.9106 0.1582 2.1536 8.9125

Coefficients:

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

(Intercept) 15.70437 8.13244 1.931 0.05552 .

schoolMS 1.24924 1.34710 0.927 0.35536

sexM 0.56828 0.81555 0.697 0.48710

addressU 0.94767 0.95224 0.995 0.32138

famsizeLE3 1.36399 0.87329 1.562 0.12060

PstatusT -0.52884 1.17209 -0.451 0.65256

Medu1 -4.25764 3.63630 -1.171 0.24367

Medu2 -4.32344 3.75446 -1.152 0.25150

Medu3 -4.19763 3.72905 -1.126 0.26226

Medu4 -2.45868 4.00368 -0.614 0.54016

Fedu2 -1.59493 1.05082 -1.518 0.13135

Fedu3 -0.62133 1.17115 -0.531 0.59659

Fedu4 -1.21756 1.30362 -0.934 0.35194

Mjobhealth 2.43352 1.88524 1.291 0.19892

Mjobother 0.78961 1.12496 0.702 0.48392

Mjobservices 3.19803 1.31923 2.424 0.01664 \*

Mjobteacher 0.73937 1.75482 0.421 0.67417

reasonhome -1.75420 0.91441 -1.918 0.05713 .

reasonother -0.44883 1.21332 -0.370 0.71201

reasonreputation -0.16396 0.94264 -0.174 0.86217

guardianmother -0.16068 0.87744 -0.183 0.85497

guardianother 1.21811 1.69991 0.717 0.47485

traveltime2 -0.19564 0.87693 -0.223 0.82379

traveltime3 0.67150 1.92979 0.348 0.72840

traveltime4 -2.48043 2.51811 -0.985 0.32633

studytime2 1.08932 0.90873 1.199 0.23269

studytime3 3.33739 1.23316 2.706 0.00766 \*\*

studytime4 2.90476 1.65804 1.752 0.08201 .

failures1 -1.88550 1.09512 -1.722 0.08736 .

failures2 -3.07801 1.79036 -1.719 0.08782 .

failures3 -3.65836 1.81071 -2.020 0.04528 \*

schoolsupyes -0.24634 1.03554 -0.238 0.81232

famsupyes -0.37619 0.81828 -0.460 0.64643

paidyes -0.48448 0.81604 -0.594 0.55369

activitiesyes -0.85239 0.72731 -1.172 0.24322

nurseryyes -0.14650 0.88086 -0.166 0.86815

higheryes 1.74035 1.58758 1.096 0.27489

internetyes 0.07937 0.99777 0.080 0.93672

romanticyes -1.93044 0.76030 -2.539 0.01222 \*

famrel2 3.81150 3.27023 1.166 0.24582

famrel3 2.36970 2.99433 0.791 0.43007

famrel4 2.62101 3.02352 0.867 0.38751

famrel5 3.28059 2.98511 1.099 0.27369

goout2 1.73826 1.71502 1.014 0.31257

goout3 1.55526 1.66398 0.935 0.35160

goout4 1.09489 1.78579 0.613 0.54081

goout5 -0.66233 1.90885 -0.347 0.72914

Dalc2 -1.77346 0.99573 -1.781 0.07710 .

Dalc3 -1.31236 1.91942 -0.684 0.49529

Dalc4 -1.83532 2.40032 -0.765 0.44581

Dalc5 -0.27893 2.66147 -0.105 0.91668

Walc2 0.97613 0.99527 0.981 0.32842

Walc3 1.98813 1.02589 1.938 0.05467 .

Walc4 0.89117 1.49293 0.597 0.55153

Walc5 3.76322 2.09569 1.796 0.07473 .

health2 -0.83734 1.48065 -0.566 0.57264

health3 -0.83028 1.38447 -0.600 0.54969

health4 -0.59542 1.34882 -0.441 0.65959

health5 -0.25797 1.28696 -0.200 0.84143

absences 0.06946 0.04581 1.516 0.13170

age -0.46223 0.34658 -1.334 0.18451

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

Residual standard error: 4.213 on 138 degrees of freedom

Multiple R-squared: 0.452, Adjusted R-squared: 0.2138

F-statistic: 1.897 on 60 and 138 DF, p-value: 0.001133

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.6837 -1.8698 0.1258 2.3559 9.3516

Coefficients:

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

(Intercept) 15.02511 8.08553 1.858 0.06520 .

schoolMS 1.32540 1.33798 0.991 0.32357

sexM 0.49162 0.81029 0.607 0.54500

addressU 0.97382 0.94433 1.031 0.30419

famsizeLE3 1.19939 0.84719 1.416 0.15905

PstatusT -0.54800 1.15264 -0.475 0.63521

Medu1 -3.80868 3.58502 -1.062 0.28986

Medu2 -4.14581 3.69426 -1.122 0.26366

Medu3 -4.29360 3.69240 -1.163 0.24685

Medu4 -2.46396 3.95168 -0.624 0.53394

Fedu2 -1.46106 1.04264 -1.401 0.16330

Fedu3 -0.37106 1.15404 -0.322 0.74828

Fedu4 -1.11302 1.29308 -0.861 0.39083

Mjobhealth 2.77115 1.83110 1.513 0.13240

Mjobother 0.89113 1.09992 0.810 0.41919

Mjobservices 3.33261 1.28250 2.599 0.01035 \*

Mjobteacher 0.56899 1.71499 0.332 0.74055

reasonhome -1.82898 0.90509 -2.021 0.04518 \*

reasonother -0.66437 1.19852 -0.554 0.58023

reasonreputation -0.17131 0.92888 -0.184 0.85394

guardianmother 0.09077 0.85847 0.106 0.91594

guardianother 1.40113 1.69186 0.828 0.40897

traveltime2 -0.14143 0.86212 -0.164 0.86992

traveltime3 0.80819 1.90319 0.425 0.67173

traveltime4 -2.79137 2.44594 -1.141 0.25570

studytime2 1.01426 0.88673 1.144 0.25462

studytime3 3.31927 1.19848 2.770 0.00636 \*\*

studytime4 2.86838 1.61681 1.774 0.07819 .

failures1 -2.04912 1.07773 -1.901 0.05928 .

failures2 -3.54963 1.75103 -2.027 0.04452 \*

failures3 -3.72186 1.79287 -2.076 0.03970 \*

schoolsupyes -0.23432 1.02616 -0.228 0.81971

famsupyes -0.32716 0.80826 -0.405 0.68626

paidyes -0.58037 0.79417 -0.731 0.46611

activitiesyes -0.77433 0.72321 -1.071 0.28613

nurseryyes -0.10666 0.87742 -0.122 0.90341

higheryes 2.01199 1.56272 1.287 0.20002

internetyes 0.17592 0.98891 0.178 0.85906

romanticyes -1.76585 0.74021 -2.386 0.01837 \*

famrel2 3.09436 3.20649 0.965 0.33617

famrel3 1.88936 2.94263 0.642 0.52187

famrel4 1.93720 2.96502 0.653 0.51459

famrel5 2.90783 2.95015 0.986 0.32598

goout2 1.57486 1.70435 0.924 0.35704

goout3 1.63650 1.65772 0.987 0.32522

goout4 0.99197 1.75231 0.566 0.57222

goout5 -0.51770 1.89669 -0.273 0.78529

Walc2 0.62582 0.96659 0.647 0.51838

Walc3 1.23202 0.93297 1.321 0.18878

Walc4 -0.08690 1.33644 -0.065 0.94825

Walc5 3.05062 1.53449 1.988 0.04873 \*

health2 -0.85420 1.46719 -0.582 0.56135

health3 -0.73782 1.37263 -0.538 0.59175

health4 -0.68684 1.34461 -0.511 0.61028

health5 -0.34466 1.27796 -0.270 0.78778

absences 0.06740 0.04545 1.483 0.14031

age -0.43319 0.34048 -1.272 0.20535

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

Residual standard error: 4.204 on 142 degrees of freedom

Multiple R-squared: 0.4385, Adjusted R-squared: 0.2171

F-statistic: 1.98 on 56 and 142 DF, p-value: 0.0006503

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc, data = train)

Residuals:

Min 1Q Median 3Q Max

-11.0869 -1.9672 0.2861 2.3944 8.6452

Coefficients:

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

(Intercept) 15.96322 8.08838 1.974 0.0503 .

schoolMS 1.25084 1.33109 0.940 0.3489

sexM 0.71093 0.77155 0.921 0.3583

addressU 0.70461 0.93661 0.752 0.4531

famsizeLE3 1.13338 0.84935 1.334 0.1842

PstatusT -0.43269 1.15026 -0.376 0.7073

Medu1 -4.02732 3.56348 -1.130 0.2603

Medu2 -4.37401 3.65438 -1.197 0.2333

Medu3 -4.53209 3.66690 -1.236 0.2185

Medu4 -2.77728 3.91135 -0.710 0.4788

Fedu2 -1.35742 1.03738 -1.309 0.1928

Fedu3 -0.51590 1.14703 -0.450 0.6535

Fedu4 -1.15972 1.29488 -0.896 0.3719

Mjobhealth 2.43737 1.82507 1.335 0.1838

Mjobother 0.74444 1.09462 0.680 0.4975

Mjobservices 3.14475 1.26634 2.483 0.0141 \*

Mjobteacher 0.64502 1.70440 0.378 0.7057

reasonhome -1.75819 0.90918 -1.934 0.0551 .

reasonother -0.26910 1.18942 -0.226 0.8213

reasonreputation 0.06117 0.92683 0.066 0.9475

guardianmother -0.03963 0.86161 -0.046 0.9634

guardianother 0.91087 1.65419 0.551 0.5827

traveltime2 -0.38151 0.84297 -0.453 0.6515

traveltime3 0.65976 1.86681 0.353 0.7243

traveltime4 -1.14505 2.30837 -0.496 0.6206

studytime2 0.72237 0.88419 0.817 0.4153

studytime3 3.07779 1.19851 2.568 0.0112 \*

studytime4 2.21171 1.59496 1.387 0.1677

failures1 -1.93574 1.08292 -1.788 0.0759 .

failures2 -3.65543 1.71821 -2.127 0.0351 \*

failures3 -3.41569 1.78739 -1.911 0.0580 .

schoolsupyes -0.32319 1.02385 -0.316 0.7527

famsupyes -0.42406 0.79029 -0.537 0.5924

paidyes -0.19900 0.77065 -0.258 0.7966

activitiesyes -0.66573 0.72222 -0.922 0.3582

nurseryyes -0.33521 0.87750 -0.382 0.7030

higheryes 2.03544 1.56302 1.302 0.1949

internetyes 0.22727 0.98232 0.231 0.8174

romanticyes -1.81991 0.74032 -2.458 0.0151 \*

famrel2 1.68487 3.16912 0.532 0.5958

famrel3 0.57429 2.90601 0.198 0.8436

famrel4 0.61336 2.91625 0.210 0.8337

famrel5 1.47346 2.88589 0.511 0.6104

goout2 1.48105 1.71172 0.865 0.3883

goout3 1.69785 1.66181 1.022 0.3086

goout4 1.07920 1.70483 0.633 0.5277

goout5 -0.12992 1.83537 -0.071 0.9437

health2 -0.78467 1.46925 -0.534 0.5941

health3 -0.51220 1.37651 -0.372 0.7104

health4 -0.69189 1.35224 -0.512 0.6097

health5 -0.34700 1.27797 -0.272 0.7864

absences 0.07540 0.04412 1.709 0.0896 .

age -0.34033 0.34040 -1.000 0.3191

---

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

Residual standard error: 4.234 on 146 degrees of freedom

Multiple R-squared: 0.4145, Adjusted R-squared: 0.206

F-statistic: 1.988 on 52 and 146 DF, p-value: 0.0007347

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian,

data = train)

Residuals:

Min 1Q Median 3Q Max

-10.4362 -1.9549 0.2178 2.3375 8.5201

Coefficients:

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

(Intercept) 15.19145 7.88990 1.925 0.0561 .

schoolMS 1.17794 1.31109 0.898 0.3704

sexM 0.70746 0.76571 0.924 0.3570

addressU 0.80658 0.90970 0.887 0.3767

famsizeLE3 1.04219 0.83139 1.254 0.2120

PstatusT -0.59244 1.09938 -0.539 0.5908

Medu1 -4.40926 3.47384 -1.269 0.2063

Medu2 -4.84522 3.52456 -1.375 0.1713

Medu3 -4.95828 3.54902 -1.397 0.1645

Medu4 -3.31277 3.75490 -0.882 0.3791

Fedu2 -1.30715 1.02808 -1.271 0.2056

Fedu3 -0.51899 1.13013 -0.459 0.6467

Fedu4 -1.14450 1.27017 -0.901 0.3690

Mjobhealth 2.57157 1.79705 1.431 0.1545

Mjobother 0.77787 1.07948 0.721 0.4723

Mjobservices 3.19865 1.24970 2.560 0.0115 \*

Mjobteacher 0.77676 1.67892 0.463 0.6443

reasonhome -1.79523 0.90211 -1.990 0.0484 \*

reasonother -0.27097 1.17978 -0.230 0.8187

reasonreputation 0.05252 0.92158 0.057 0.9546

traveltime2 -0.33200 0.83407 -0.398 0.6912

traveltime3 0.73321 1.84935 0.396 0.6923

traveltime4 -1.04392 2.28856 -0.456 0.6490

studytime2 0.74335 0.87835 0.846 0.3987

studytime3 3.10496 1.19092 2.607 0.0101 \*

studytime4 2.22270 1.57865 1.408 0.1612

failures1 -1.83722 1.04672 -1.755 0.0813 .

failures2 -3.33109 1.62440 -2.051 0.0421 \*

failures3 -3.47538 1.77484 -1.958 0.0521 .

schoolsupyes -0.35967 1.01559 -0.354 0.7237

famsupyes -0.43837 0.78300 -0.560 0.5764

paidyes -0.17652 0.76527 -0.231 0.8179

activitiesyes -0.59850 0.70964 -0.843 0.4004

nurseryyes -0.45642 0.84395 -0.541 0.5894

higheryes 2.01575 1.55376 1.297 0.1965

internetyes 0.19419 0.96221 0.202 0.8403

romanticyes -1.81209 0.73609 -2.462 0.0150 \*

famrel2 1.92915 3.12618 -reason0.617 0.5381

famrel3 0.79574 2.85878 0.278 0.7811

famrel4 0.90889 2.85823 0.318 0.7509

famrel5 1.72094 2.83465 0.607 0.5447

goout2 1.32664 1.66099 0.799 0.4257

goout3 1.52611 1.60862 0.949 0.3443

goout4 0.86938 1.64425 0.529 0.5978

goout5 -0.39840 1.74330 -0.229 0.8195

health2 -0.76048 1.45354 -0.523 0.6016

health3 -0.42190 1.35532 -0.311 0.7560

health4 -0.67212 1.34266 -0.501 0.6174

health5 -0.31977 1.26558 -0.253 0.8009

absences 0.07877 0.04297 1.833 0.0688 .

age -0.26746 0.31687 -0.844 0.4000

---

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

Residual standard error: 4.21 on 148 degrees of freedom

Multiple R-squared: 0.413, Adjusted R-squared: 0.2147

F-statistic: 2.083 on 50 and 148 DF, p-value: 0.0003738

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.1834 -2.0550 0.2459 2.3486 9.1253

Coefficients:

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

(Intercept) 15.74212 7.87323 1.999 0.0474 \*

schoolMS 1.12040 1.28251 0.874 0.3837

sexM 0.61981 0.75985 0.816 0.4160

addressU 0.68326 0.90531 0.755 0.4516

famsizeLE3 0.98654 0.82967 1.189 0.2363

PstatusT -0.38039 1.09776 -0.347 0.7294

Medu1 -4.50945 3.49713 -1.289 0.1992

Medu2 -4.71500 3.54486 -1.330 0.1855

Medu3 -5.06326 3.57217 -1.417 0.1584

Medu4 -3.11614 3.77205 -0.826 0.4100

Fedu2 -1.66031 1.01210 -1.640 0.1030

Fedu3 -0.78531 1.11497 -0.704 0.4823

Fedu4 -1.49621 1.26479 -1.183 0.2387

Mjobhealth 2.58931 1.79815 1.440 0.1519

Mjobother 0.59747 1.06129 0.563 0.5743

Mjobservices 3.15126 1.24553 2.530 0.0124 \*

Mjobteacher 0.69549 1.68620 0.412 0.6806

traveltime2 -0.48518 0.83142 -0.584 0.5604

traveltime3 1.12079 1.85265 0.605 0.5461

traveltime4 -0.59513 2.26487 -0.263 0.7931

studytime2 0.79115 0.88199 0.897 0.3711

studytime3 3.04874 1.19579 2.550 0.0118 \*

studytime4 2.64011 1.57301 1.678 0.0953 .

failures1 -2.16668 1.03904 -2.085 0.0387 \*

failures2 -3.06066 1.62038 -1.889 0.0608 .

failures3 -4.10635 1.76620 -2.325 0.0214 \*

schoolsupyes -0.55382 1.01510 -0.546 0.5862

famsupyes -0.52020 0.77952 -0.667 0.5056

paidyes -0.43183 0.75450 -0.572 0.5679

activitiesyes -0.67862 0.70084 -0.968 0.3344

nurseryyes -0.57614 0.83524 -0.690 0.4914

higheryes 1.78543 1.54133 1.158 0.2485

internetyes 0.23230 0.96788 0.240 0.8106

romanticyes -1.75350 0.74107 -2.366 0.0192 \*

famrel2 2.43280 3.07834 0.790 0.4306

famrel3 0.57384 2.83373 0.203 0.8398

famrel4 1.08842 2.82384 0.385 0.7005

famrel5 1.90227 2.80284 0.679 0.4984

goout2 1.38103 1.64842 0.838 0.4035

goout3 1.46006 1.59660 0.914 0.3619

goout4 0.95656 1.63520 0.585 0.5594

goout5 -0.37596 1.72241 -0.218 0.8275

health2 -1.38429 1.43757 -0.963 0.3371

health3 -0.81188 1.35363 -0.600 0.5496

health4 -0.93192 1.34243 -0.694 0.4886

health5 -0.62683 1.25847 -0.498 0.6191

absences 0.07109 0.04307 1.651 0.1009

age -0.26961 0.31833 -0.847 0.3984

---

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

Residual standard error: 4.243 on 151 degrees of freedom

Multiple R-squared: 0.3919, Adjusted R-squared: 0.2026

F-statistic: 2.07 on 47 and 151 DF, p-value: 0.0004996

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.1879 -1.9734 0.2146 2.3258 9.0308

Coefficients:

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

(Intercept) 15.69691 7.25205 2.164 0.03196 \*

schoolMS 1.05506 1.26671 0.833 0.40617

sexM 0.73156 0.75356 0.971 0.33316

addressU 0.54711 0.88789 0.616 0.53867

famsizeLE3 0.89128 0.81673 1.091 0.27684

PstatusT -0.45193 1.05583 -0.428 0.66922

Medu1 -3.95943 3.40668 -1.162 0.24692

Medu2 -4.06870 3.44811 -1.180 0.23982

Medu3 -4.32216 3.46463 -1.248 0.21409

Medu4 -2.37787 3.64514 -0.652 0.51515

Fedu2 -1.68444 1.00058 -1.683 0.09430 .

Fedu3 -0.79279 1.10768 -0.716 0.47524

Fedu4 -1.48092 1.25530 -1.180 0.23992

Mjobhealth 2.74539 1.74851 1.570 0.11843

Mjobother 0.67600 1.05371 0.642 0.52211

Mjobservices 3.19972 1.21998 2.623 0.00959 \*\*

Mjobteacher 0.56998 1.65457 0.344 0.73095

traveltime2 -0.53882 0.82601 -0.652 0.51517

traveltime3 1.09400 1.79724 0.609 0.54361

traveltime4 -0.39586 2.22630 -0.178 0.85910

studytime2 0.87912 0.87450 1.005 0.31633

studytime3 3.25764 1.17972 2.761 0.00645 \*\*

studytime4 2.64474 1.54109 1.716 0.08813 .

failures1 -2.24816 1.03211 -2.178 0.03090 \*

failures2 -3.43451 1.59090 -2.159 0.03240 \*

failures3 -4.03251 1.74757 -2.307 0.02235 \*

schoolsupyes -0.49145 1.00927 -0.487 0.62699

famsupyes -0.72484 0.76281 -0.950 0.34348

paidyes -0.58183 0.73313 -0.794 0.42862

activitiesyes -0.70268 0.69059 -1.018 0.31050

nurseryyes -0.50781 0.81401 -0.624 0.53366

higheryes 2.04337 1.51716 1.347 0.18000

internetyes 0.24157 0.95798 0.252 0.80125

romanticyes -1.87120 0.73462 -2.547 0.01183 \*

goout2 1.50721 1.61479 0.933 0.35208

goout3 1.57125 1.56589 1.003 0.31722

goout4 1.08335 1.61075 0.673 0.50222

goout5 -0.07031 1.69762 -0.041 0.96702

health2 -1.47886 1.41838 -1.043 0.29874

health3 -0.86556 1.33759 -0.647 0.51852

health4 -0.98680 1.32127 -0.747 0.45628

health5 -0.64393 1.24136 -0.519 0.60469

absences 0.07299 0.04245 1.720 0.08752 .

age -0.23640 0.30946 -0.764 0.44608

---

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

Residual standard error: 4.227 on 155 degrees of freedom

Multiple R-squared: 0.3803, Adjusted R-squared: 0.2084

F-statistic: 2.212 on 43 and 155 DF, p-value: 0.0002175

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.6844 -1.8211 0.1177 2.4733 9.3591

Coefficients:

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

(Intercept) 18.36284 7.01056 2.619 0.00966 \*\*

schoolMS 1.04476 1.25393 0.833 0.40599

sexM 0.78125 0.75129 1.040 0.29997

addressU 0.62644 0.88270 0.710 0.47894

famsizeLE3 0.96219 0.80151 1.200 0.23174

PstatusT -0.60455 1.04499 -0.579 0.56373

Medu1 -4.35750 3.39240 -1.284 0.20084

Medu2 -4.74228 3.41587 -1.388 0.16698

Medu3 -4.81998 3.44395 -1.400 0.16360

Medu4 -2.90636 3.61844 -0.803 0.42305

Fedu2 -1.73716 0.98649 -1.761 0.08017 .

Fedu3 -0.87892 1.09761 -0.801 0.42447

Fedu4 -1.49783 1.24544 -1.203 0.23090

Mjobhealth 2.63879 1.71686 1.537 0.12629

Mjobother 0.55397 1.03362 0.536 0.59274

Mjobservices 2.99938 1.20537 2.488 0.01386 \*

Mjobteacher 0.52799 1.64358 0.321 0.74845

traveltime2 -0.64573 0.81748 -0.790 0.43076

traveltime3 0.42607 1.74749 0.244 0.80769

traveltime4 -0.87575 2.19118 -0.400 0.68993

studytime2 0.84336 0.86139 0.979 0.32903

studytime3 3.46484 1.15657 2.996 0.00318 \*\*

studytime4 2.51206 1.53418 1.637 0.10353

failures1 -2.25823 1.01545 -2.224 0.02757 \*

failures2 -3.34763 1.57421 -2.127 0.03500 \*

failures3 -4.47718 1.71545 -2.610 0.00992 \*\*

schoolsupyes -0.50309 1.00234 -0.502 0.61642

famsupyes -0.76726 0.75616 -1.015 0.31180

paidyes -0.52250 0.72358 -0.722 0.47129

activitiesyes -0.70812 0.68004 -1.041 0.29932

nurseryyes -0.47909 0.79851 -0.600 0.54938

higheryes 2.17020 1.51114 1.436 0.15293

internetyes -0.02265 0.94254 -0.024 0.98086

romanticyes -1.92855 0.73230 -2.634 0.00928 \*\*

health2 -1.35891 1.40155 -0.970 0.33373

health3 -0.52727 1.31515 -0.401 0.68902

health4 -0.81801 1.30714 -0.626 0.53234

health5 -0.61457 1.22402 -0.502 0.61630

absences 0.07618 0.04202 1.813 0.07173 .

age -0.28500 0.30633 -0.930 0.35359

---

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

Residual standard error: 4.22 on 159 degrees of freedom

Multiple R-squared: 0.3666, Adjusted R-squared: 0.2112

F-statistic: 2.359 on 39 and 159 DF, p-value: 0.0001025

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout - internet, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.6837 -1.8158 0.1324 2.4839 9.3593

Coefficients:

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

(Intercept) 18.33389 6.88464 2.663 0.00854 \*\*

schoolMS 1.04832 1.24127 0.845 0.39962

sexM 0.77844 0.73981 1.052 0.29429

addressU 0.62295 0.86796 0.718 0.47398

famsizeLE3 0.96082 0.79698 1.206 0.22976

PstatusT -0.60456 1.04172 -0.580 0.56250

Medu1 -4.36503 3.36734 -1.296 0.19674

Medu2 -4.75073 3.38709 -1.403 0.16267

Medu3 -4.82587 3.42450 -1.409 0.16071

Medu4 -2.91253 3.59804 -0.809 0.41944

Fedu2 -1.73822 0.98243 -1.769 0.07875 .

Fedu3 -0.88096 1.09093 -0.808 0.42056

Fedu4 -1.49964 1.23927 -1.210 0.22802

Mjobhealth 2.63370 1.69846 1.551 0.12296

Mjobother 0.55280 1.02924 0.537 0.59195

Mjobservices 2.99691 1.19722 2.503 0.01331 \*

Mjobteacher 0.52416 1.63069 0.321 0.74830

traveltime2 -0.64715 0.81280 -0.796 0.42710

traveltime3 0.43016 1.73373 0.248 0.80436

traveltime4 -0.87145 2.17703 -0.400 0.68947

studytime2 0.84358 0.85865 0.982 0.32736

studytime3 3.46172 1.14564 3.022 0.00293 \*\*

studytime4 2.51159 1.52926 1.642 0.10248

failures1 -2.25792 1.01219 -2.231 0.02709 \*

failures2 -3.34962 1.56710 -2.137 0.03408 \*

failures3 -4.47855 1.70915 -2.620 0.00963 \*\*

schoolsupyes -0.50412 0.99829 -0.505 0.61427

famsupyes -0.76860 0.75175 -1.022 0.30813

paidyes -0.52370 0.71960 -0.728 0.46782

activitiesyes -0.70692 0.67610 -1.046 0.29733

nurseryyes -0.47545 0.78162 -0.608 0.54386

higheryes 2.17215 1.50423 1.444 0.15068

romanticyes -1.93014 0.72702 -2.655 0.00874 \*\*

health2 -1.35998 1.39647 -0.974 0.33159

health3 -0.52307 1.29937 -0.403 0.68781

health4 -0.81399 1.29232 -0.630 0.52968

health5 -0.60938 1.20104 -0.507 0.61259

absences 0.07600 0.04125 1.842 0.06726 .

age -0.28382 0.30145 -0.942 0.34786

---

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

Residual standard error: 4.207 on 160 degrees of freedom

Multiple R-squared: 0.3666, Adjusted R-squared: 0.2161

F-statistic: 2.436 on 38 and 160 DF, p-value: 6.386e-05

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout - internet - traveltime, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.6106 -1.7332 0.2129 2.5197 9.4291

Coefficients:

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

(Intercept) 17.65701 6.79953 2.597 0.01027 \*

schoolMS 0.74956 1.16995 0.641 0.52264

sexM 0.73330 0.72869 1.006 0.31575

addressU 0.71586 0.83308 0.859 0.39144

famsizeLE3 0.83739 0.77503 1.080 0.28154

PstatusT -0.69377 1.03039 -0.673 0.50170

Medu1 -4.02916 3.30721 -1.218 0.22487

Medu2 -4.51092 3.33962 -1.351 0.17865

Medu3 -4.58330 3.38155 -1.355 0.17717

Medu4 -2.84635 3.56970 -0.797 0.42640

Fedu2 -1.60402 0.96205 -1.667 0.09737 .

Fedu3 -0.68879 1.06459 -0.647 0.51854

Fedu4 -1.28808 1.21044 -1.064 0.28884

Mjobhealth 2.82425 1.66008 1.701 0.09080 .

Mjobother 0.53757 1.01581 0.529 0.59738

Mjobservices 3.01993 1.16993 2.581 0.01072 \*

Mjobteacher 0.67295 1.60721 0.419 0.67598

studytime2 0.88286 0.85108 1.037 0.30112

studytime3 3.49449 1.12641 3.102 0.00226 \*\*

studytime4 2.48045 1.50960 1.643 0.10229

failures1 -2.22237 0.99868 -2.225 0.02743 \*

failures2 -3.50377 1.51308 -2.316 0.02182 \*

failures3 -4.41641 1.64434 -2.686 0.00798 \*\*

schoolsupyes -0.55624 0.98265 -0.566 0.57213

famsupyes -0.72195 0.73830 -0.978 0.32960

paidyes -0.61818 0.70465 -0.877 0.38162

activitiesyes -0.68520 0.67111 -1.021 0.30877

nurseryyes -0.48189 0.77604 -0.621 0.53550

higheryes 2.12738 1.49202 1.426 0.15583

romanticyes -1.95630 0.70891 -2.760 0.00645 \*\*

health2 -1.35372 1.37568 -0.984 0.32656

health3 -0.60308 1.28760 -0.468 0.64014

health4 -0.89655 1.27287 -0.704 0.48222

health5 -0.63852 1.18970 -0.537 0.59220

absences 0.07563 0.04092 1.848 0.06635 .

age -0.26764 0.29729 -0.900 0.36931

---

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

Residual standard error: 4.18 on 163 degrees of freedom

Multiple R-squared: 0.3629, Adjusted R-squared: 0.226

F-statistic: 2.652 on 35 and 163 DF, p-value: 1.919e-05

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout - internet - traveltime - health,

data = train)

Residuals:

Min 1Q Median 3Q Max

-10.9061 -1.7204 0.1754 2.4904 8.9443

Coefficients:

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

(Intercept) 17.11806 6.47649 2.643 0.00900 \*\*

schoolMS 0.79755 1.15725 0.689 0.49167

sexM 0.74740 0.70713 1.057 0.29206

addressU 0.66957 0.81783 0.819 0.41412

famsizeLE3 0.91934 0.75981 1.210 0.22801

PstatusT -0.78250 1.01091 -0.774 0.43999

Medu1 -3.67825 3.23197 -1.138 0.25672

Medu2 -4.31185 3.26518 -1.321 0.18846

Medu3 -4.30248 3.30175 -1.303 0.19434

Medu4 -2.48316 3.47024 -0.716 0.47526

Fedu2 -1.59359 0.93288 -1.708 0.08945 .

Fedu3 -0.74490 1.03026 -0.723 0.47068

Fedu4 -1.30247 1.19183 -1.093 0.27604

Mjobhealth 2.88349 1.63719 1.761 0.08003 .

Mjobother 0.59155 1.00463 0.589 0.55678

Mjobservices 3.02009 1.14742 2.632 0.00928 \*\*

Mjobteacher 0.59474 1.56961 0.379 0.70524

studytime2 0.86873 0.83651 1.039 0.30053

studytime3 3.50345 1.10910 3.159 0.00188 \*\*

studytime4 2.46017 1.48039 1.662 0.09842 .

failures1 -2.26960 0.98654 -2.301 0.02265 \*

failures2 -3.51844 1.48764 -2.365 0.01917 \*

failures3 -4.32325 1.58629 -2.725 0.00711 \*\*

schoolsupyes -0.47521 0.93851 -0.506 0.61328

famsupyes -0.70125 0.72345 -0.969 0.33378

paidyes -0.63471 0.69647 -0.911 0.36344

activitiesyes -0.66429 0.65689 -1.011 0.31335

nurseryyes -0.49159 0.76075 -0.646 0.51904

higheryes 2.13294 1.46118 1.460 0.14624

romanticyes -1.98666 0.69486 -2.859 0.00479 \*\*

absences 0.07743 0.04039 1.917 0.05694 .

age -0.29111 0.28861 -1.009 0.31460

---

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

Residual standard error: 4.144 on 167 degrees of freedom

Multiple R-squared: 0.3585, Adjusted R-squared: 0.2394

F-statistic: 3.011 on 31 and 167 DF, p-value: 3.063e-06

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout - internet - traveltime - health -

schoolsup, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.884 -1.647 0.225 2.492 8.964

Coefficients:

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

(Intercept) 16.75283 6.42194 2.609 0.00991 \*\*

schoolMS 0.82015 1.15383 0.711 0.47819

sexM 0.77886 0.70284 1.108 0.26937

addressU 0.65535 0.81554 0.804 0.42277

famsizeLE3 0.91385 0.75805 1.206 0.22970

PstatusT -0.77674 1.00860 -0.770 0.44231

Medu1 -3.73000 3.22319 -1.157 0.24882

Medu2 -4.30693 3.25793 -1.322 0.18797

Medu3 -4.25527 3.29312 -1.292 0.19807

Medu4 -2.44225 3.46161 -0.706 0.48146

Fedu2 -1.57266 0.92990 -1.691 0.09265 .

Fedu3 -0.74258 1.02797 -0.722 0.47107

Fedu4 -1.30644 1.18916 -1.099 0.27350

Mjobhealth 2.89138 1.63349 1.770 0.07853 .

Mjobother 0.55511 0.99983 0.555 0.57950

Mjobservices 2.97162 1.14089 2.605 0.01002 \*

Mjobteacher 0.60387 1.56603 0.386 0.70027

studytime2 0.85492 0.83422 1.025 0.30692

studytime3 3.51296 1.10648 3.175 0.00178 \*\*

studytime4 2.52027 1.47236 1.712 0.08879 .

failures1 -2.29131 0.98343 -2.330 0.02100 \*

failures2 -3.55430 1.48266 -2.397 0.01762 \*

failures3 -4.31468 1.58268 -2.726 0.00709 \*\*

famsupyes -0.73981 0.71783 -1.031 0.30420

paidyes -0.63776 0.69490 -0.918 0.36005

activitiesyes -0.70059 0.65152 -1.075 0.28377

nurseryyes -0.50261 0.75875 -0.662 0.50861

higheryes 2.10861 1.45715 1.447 0.14974

romanticyes -1.97252 0.69276 -2.847 0.00496 \*\*

absences 0.07599 0.04020 1.890 0.06045 .

age -0.26876 0.28458 -0.944 0.34632

---

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

Residual standard error: 4.134 on 168 degrees of freedom

Multiple R-squared: 0.3575, Adjusted R-squared: 0.2428

F-statistic: 3.116 on 30 and 168 DF, p-value: 1.849e-06

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout - internet - traveltime - health -

schoolsup - nursery, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.9666 -1.7016 0.2582 2.4547 8.8446

Coefficients:

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

(Intercept) 16.24899 6.36614 2.552 0.01158 \*

schoolMS 0.88371 1.14792 0.770 0.44247

sexM 0.74909 0.70023 1.070 0.28625

addressU 0.69625 0.81185 0.858 0.39232

famsizeLE3 0.88616 0.75564 1.173 0.24256

PstatusT -0.68552 0.99750 -0.687 0.49287

Medu1 -3.76707 3.21735 -1.171 0.24330

Medu2 -4.41676 3.24830 -1.360 0.17573

Medu3 -4.37430 3.28275 -1.333 0.18449

Medu4 -2.54357 3.45248 -0.737 0.46230

Fedu2 -1.58936 0.92801 -1.713 0.08861 .

Fedu3 -0.78716 1.02406 -0.769 0.44316

Fedu4 -1.33471 1.18642 -1.125 0.26219

Mjobhealth 2.81350 1.62654 1.730 0.08550 .

Mjobother 0.62096 0.99323 0.625 0.53268

Mjobservices 3.01271 1.13731 2.649 0.00884 \*\*

Mjobteacher 0.57071 1.56263 0.365 0.71540

studytime2 0.79734 0.82830 0.963 0.33711

studytime3 3.49041 1.10412 3.161 0.00186 \*\*

studytime4 2.45258 1.46637 1.673 0.09626 .

failures1 -2.27017 0.98128 -2.313 0.02190 \*

failures2 -3.42755 1.46782 -2.335 0.02071 \*

failures3 -4.23132 1.57505 -2.686 0.00794 \*\*

famsupyes -0.69623 0.71363 -0.976 0.33064

paidyes -0.66432 0.69259 -0.959 0.33884

activitiesyes -0.64571 0.64515 -1.001 0.31832

higheryes 2.13087 1.45434 1.465 0.14473

romanticyes -1.99455 0.69081 -2.887 0.00439 \*\*

absences 0.07369 0.03998 1.843 0.06709 .

age -0.26263 0.28396 -0.925 0.35634

---

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

Residual standard error: 4.128 on 169 degrees of freedom

Multiple R-squared: 0.3558, Adjusted R-squared: 0.2453

F-statistic: 3.219 on 29 and 169 DF, p-value: 1.173e-06

Call:

lm(formula = G3 ~ . - freetime - Fjob - Dalc - Walc - guardian -

reason - famrel - goout - internet - traveltime - health -

schoolsup - nursery - Pstatus, data = train)

Residuals:

Min 1Q Median 3Q Max

-11.0796 -1.6999 0.2146 2.3395 8.8757

Coefficients:

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

(Intercept) 15.49775 6.26185 2.475 0.01431 \*

schoolMS 0.86096 1.14566 0.751 0.45339

sexM 0.71938 0.69781 1.031 0.30405

addressU 0.68582 0.81044 0.846 0.39861

famsizeLE3 0.94775 0.74914 1.265 0.20756

Medu1 -3.75811 3.21233 -1.170 0.24368

Medu2 -4.35893 3.24216 -1.344 0.18059

Medu3 -4.23437 3.27134 -1.294 0.19729

Medu4 -2.35520 3.43624 -0.685 0.49402

Fedu2 -1.60892 0.92614 -1.737 0.08416 .

Fedu3 -0.80880 1.02198 -0.791 0.42981

Fedu4 -1.30876 1.18397 -1.105 0.27055

Mjobhealth 2.63660 1.60355 1.644 0.10198

Mjobother 0.63059 0.99158 0.636 0.52567

Mjobservices 3.04182 1.13475 2.681 0.00807 \*\*

Mjobteacher 0.42657 1.54609 0.276 0.78296

studytime2 0.81297 0.82670 0.983 0.32681

studytime3 3.42625 1.09846 3.119 0.00213 \*\*

studytime4 2.39779 1.46192 1.640 0.10282

failures1 -2.27748 0.97969 -2.325 0.02127 \*

failures2 -3.48085 1.46349 -2.378 0.01849 \*

failures3 -4.13858 1.56682 -2.641 0.00903 \*\*

famsupyes -0.70165 0.71247 -0.985 0.32611

paidyes -0.66581 0.69151 -0.963 0.33700

activitiesyes -0.66054 0.64379 -1.026 0.30634

higheryes 2.23478 1.44422 1.547 0.12363

romanticyes -1.95421 0.68725 -2.844 0.00501 \*\*

absences 0.07122 0.03976 1.791 0.07503 .

age -0.26339 0.28351 -0.929 0.35419

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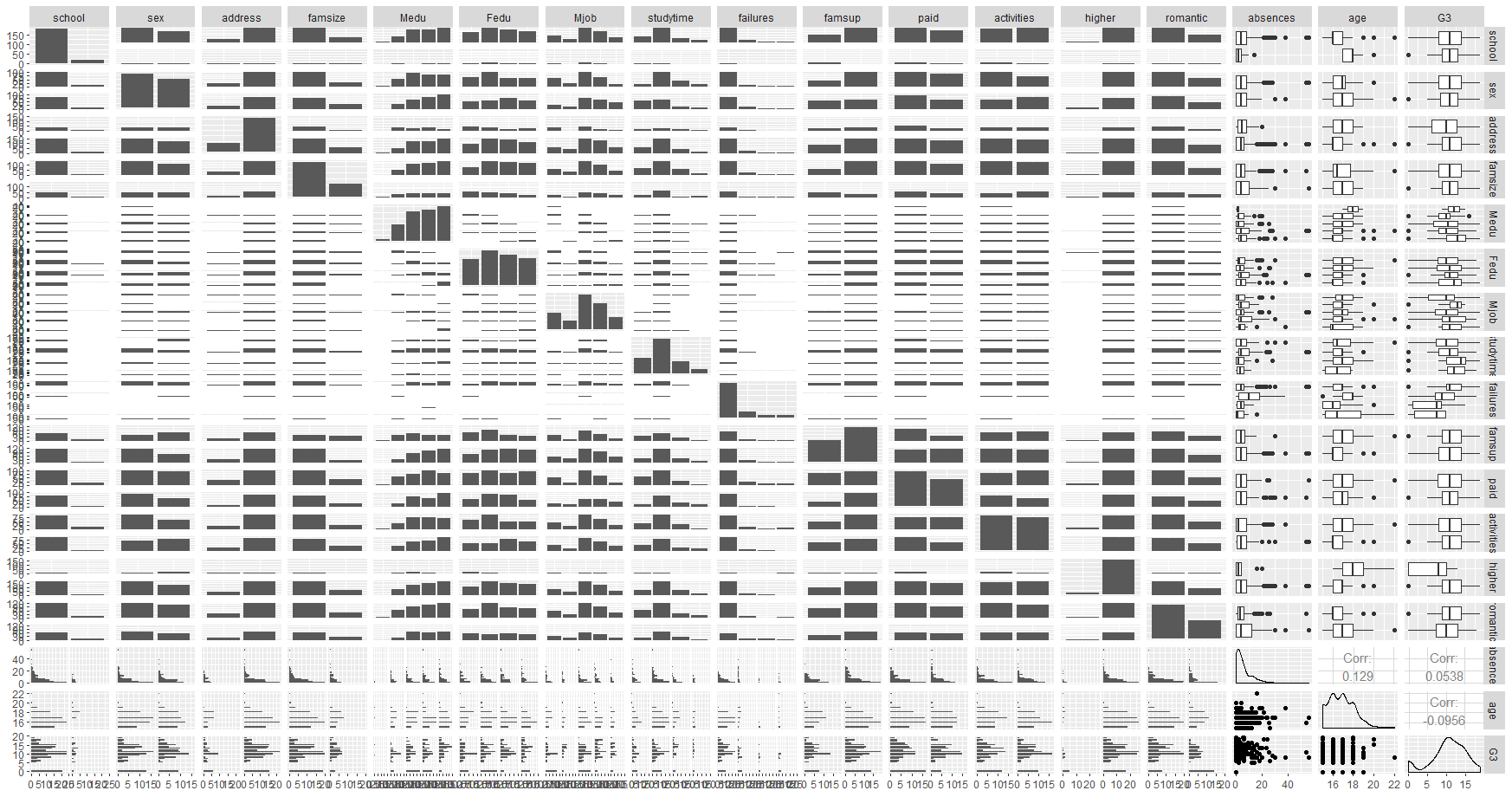
Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

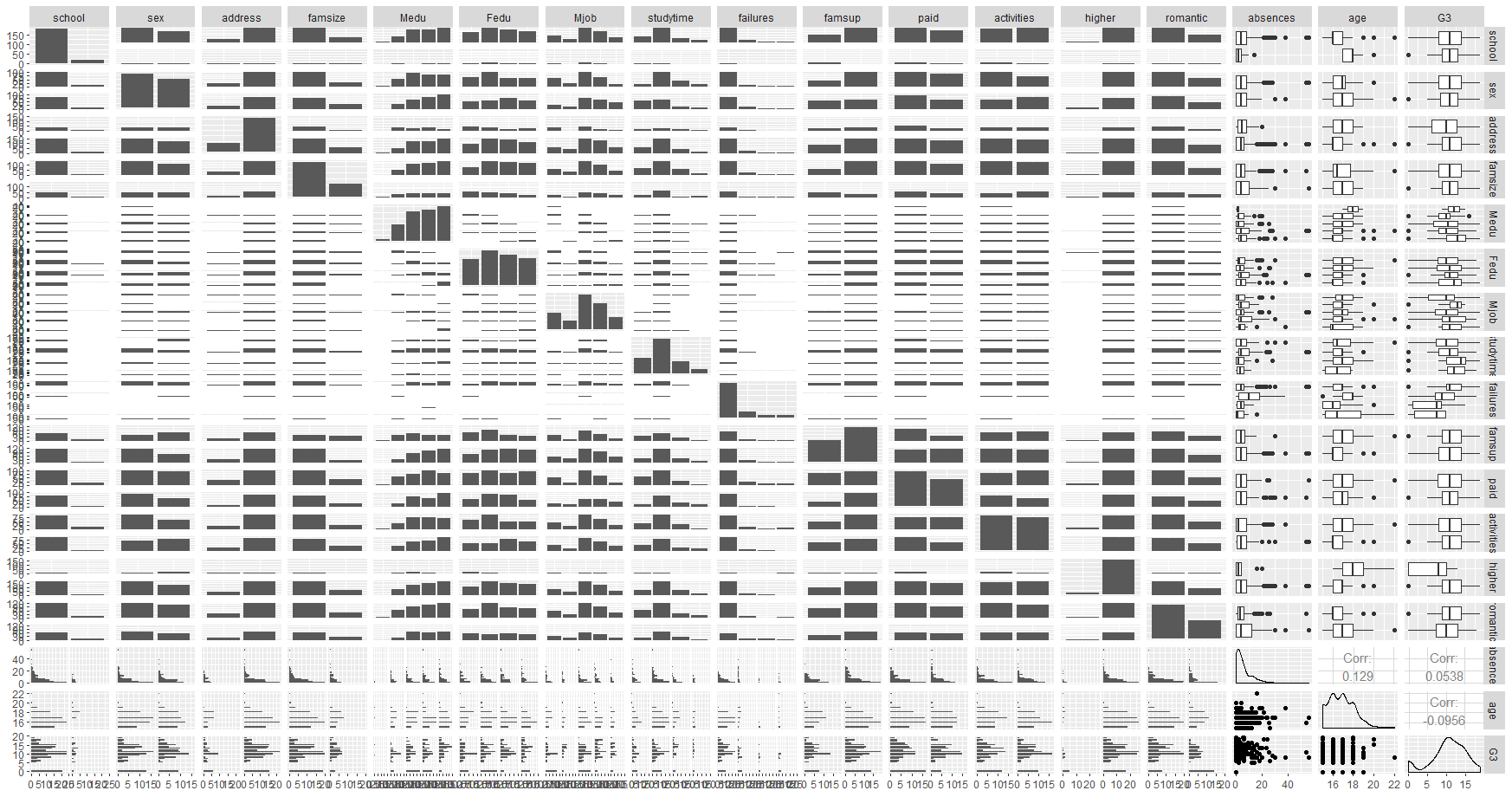
Residual standard error: 4.121 on 170 degrees of freedom

Multiple R-squared: 0.354, Adjusted R-squared: 0.2476

F-statistic: 3.328 on 28 and 170 DF, p-value: 7.426e-07

Based on these pictures I removed the above





Call:

lm(formula = G3 ~ Medu + Fedu + Mjob + studytime + failures +

higher + romantic + absences + age, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.9207 -1.7596 0.2542 2.9036 8.4147

Coefficients:

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

(Intercept) 14.53368 5.93789 2.448 0.01536 \*

Medu1 -4.18728 3.17828 -1.317 0.18939

Medu2 -5.19243 3.21331 -1.616 0.10789

Medu3 -4.85297 3.23777 -1.499 0.13569

Medu4 -3.17815 3.39969 -0.935 0.35115

Fedu2 -1.55589 0.91023 -1.709 0.08914 .

Fedu3 -0.98296 1.00328 -0.980 0.32855

Fedu4 -1.46615 1.14230 -1.284 0.20099

Mjobhealth 2.71703 1.58171 1.718 0.08759 .

Mjobother 0.86528 0.98519 0.878 0.38098

Mjobservices 3.35329 1.11587 3.005 0.00304 \*\*

Mjobteacher 0.75576 1.50923 0.501 0.61716

studytime2 0.37771 0.76519 0.494 0.62219

studytime3 2.63305 1.02663 2.565 0.01115 \*

studytime4 1.22607 1.33706 0.917 0.36040

failures1 -2.30094 0.96993 -2.372 0.01875 \*

failures2 -4.00668 1.44141 -2.780 0.00603 \*\*

failures3 -4.52243 1.55464 -2.909 0.00409 \*\*

higheryes 1.90616 1.37867 1.383 0.16853

romanticyes -1.81862 0.68380 -2.660 0.00854 \*\*

absences 0.05343 0.03849 1.388 0.16682

age -0.11147 0.26805 -0.416 0.67803

---

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

Residual standard error: 4.146 on 177 degrees of freedom

Multiple R-squared: 0.3195, Adjusted R-squared: 0.2387

F-statistic: 3.956 on 21 and 177 DF, p-value: 1.927e-07

Call:

lm(formula = G3 ~ Medu + Fedu + Mjob + studytime + failures +

higher + romantic, data = train)

Residuals:

Min 1Q Median 3Q Max

-11.1398 -1.8081 0.2683 2.8330 8.5407

Coefficients:

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

(Intercept) 12.6191 3.2597 3.871 0.000152 \*\*\*

Medu1 -4.1588 3.1730 -1.311 0.191643

Medu2 -5.1484 3.2058 -1.606 0.110050

Medu3 -4.6501 3.2311 -1.439 0.151848

Medu4 -2.9313 3.3907 -0.865 0.388463

Fedu2 -1.5697 0.9100 -1.725 0.086261 .

Fedu3 -0.8712 0.9962 -0.875 0.383005

Fedu4 -1.4661 1.1283 -1.299 0.195466

Mjobhealth 2.5390 1.5765 1.611 0.109034

Mjobother 0.8281 0.9844 0.841 0.401340

Mjobservices 3.3181 1.1155 2.975 0.003339 \*\*

Mjobteacher 0.5888 1.5045 0.391 0.695989

studytime2 0.3626 0.7628 0.475 0.635150

studytime3 2.3664 1.0071 2.350 0.019873 \*

studytime4 1.0920 1.3301 0.821 0.412766

failures1 -2.1072 0.9276 -2.272 0.024290 \*

failures2 -4.0964 1.4296 -2.865 0.004663 \*\*

failures3 -4.5893 1.5533 -2.955 0.003552 \*\*

higheryes 2.1919 1.3394 1.636 0.103504

romanticyes -1.7173 0.6668 -2.576 0.010813 \*

---

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

Residual standard error: 4.145 on 179 degrees of freedom

Multiple R-squared: 0.3118, Adjusted R-squared: 0.2387

F-statistic: 4.268 on 19 and 179 DF, p-value: 9.441e-08

Call:

lm(formula = G3 ~ Medu + Fedu + Mjob + studytime + failures +

romantic, data = train)

Residuals:

Min 1Q Median 3Q Max

-10.8659 -1.8177 0.2995 2.7778 8.9566

Coefficients:

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

(Intercept) 13.7226 3.2040 4.283 3e-05 \*\*\*

Medu1 -3.4145 3.1549 -1.082 0.280573

Medu2 -4.6304 3.2050 -1.445 0.150271

Medu3 -3.9733 3.2194 -1.234 0.218757

Medu4 -2.2813 3.3830 -0.674 0.500950

Fedu2 -1.3881 0.9074 -1.530 0.127835

Fedu3 -0.6607 0.9925 -0.666 0.506447

Fedu4 -1.2498 1.1257 -1.110 0.268369

Mjobhealth 2.7333 1.5793 1.731 0.085222 .

Mjobother 0.9465 0.9863 0.960 0.338558

Mjobservices 3.4856 1.1160 3.123 0.002084 \*\*

Mjobteacher 0.6180 1.5114 0.409 0.683097

studytime2 0.4911 0.7623 0.644 0.520209

studytime3 2.6431 0.9974 2.650 0.008766 \*\*

studytime4 1.3923 1.3235 1.052 0.294231

failures1 -2.2329 0.9287 -2.404 0.017212 \*

failures2 -4.1933 1.4350 -2.922 0.003921 \*\*

failures3 -5.1913 1.5161 -3.424 0.000764 \*\*\*

romanticyes -1.8159 0.6671 -2.722 0.007127 \*\*

---

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

Residual standard error: 4.165 on 180 degrees of freedom

Multiple R-squared: 0.3015, Adjusted R-squared: 0.2316

F-statistic: 4.316 on 18 and 180 DF, p-value: 1.265e-07

Call:

lm(formula = G3 ~ Fedu + Mjob + studytime + failures + romantic,

data = train)

Residuals:

Min 1Q Median 3Q Max

-11.593 -2.127 0.365 2.824 8.240

Coefficients:

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

(Intercept) 9.8938 1.1616 8.517 5.72e-15 \*\*\*

Fedu2 -1.4391 0.8852 -1.626 0.105707

Fedu3 -0.5903 0.9514 -0.620 0.535721

Fedu4 -0.6496 0.9981 -0.651 0.515951

Mjobhealth 3.7882 1.3125 2.886 0.004365 \*\*

Mjobother 0.8727 0.9255 0.943 0.346958

Mjobservices 3.5260 0.9647 3.655 0.000335 \*\*\*

Mjobteacher 1.7780 1.2093 1.470 0.143199

studytime2 0.4588 0.7644 0.600 0.549120

studytime3 2.7957 0.9913 2.820 0.005327 \*\*

studytime4 1.1945 1.3306 0.898 0.370505

failures1 -2.1649 0.9315 -2.324 0.021211 \*

failures2 -4.1760 1.4321 -2.916 0.003986 \*\*

failures3 -4.8111 1.4758 -3.260 0.001327 \*\*

romanticyes -1.9688 0.6556 -3.003 0.003043 \*\*

---

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

Residual standard error: 4.197 on 184 degrees of freedom

Multiple R-squared: 0.2747, Adjusted R-squared: 0.2195

F-statistic: 4.978 on 14 and 184 DF, p-value: 7.967e-08

Call:

lm(formula = G3 ~ Mjob + studytime + failures + romantic, data = train)

Residuals:

Min 1Q Median 3Q Max

-11.9602 -2.0057 0.4585 2.7763 8.5899

Coefficients:

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

(Intercept) 9.2572 1.0394 8.906 4.63e-16 \*\*\*

Mjobhealth 3.5863 1.2716 2.820 0.005316 \*\*

Mjobother 0.7850 0.9089 0.864 0.388883

Mjobservices 3.4982 0.9477 3.691 0.000293 \*\*\*

Mjobteacher 1.7376 1.1471 1.515 0.131532

studytime2 0.3118 0.7573 0.412 0.681007

studytime3 2.6871 0.9873 2.722 0.007107 \*\*

studytime4 1.0174 1.3085 0.778 0.437819

failures1 -2.0346 0.9231 -2.204 0.028735 \*

failures2 -4.3412 1.4260 -3.044 0.002668 \*\*

failures3 -4.4557 1.4230 -3.131 0.002020 \*\*

romanticyes -1.8125 0.6486 -2.794 0.005743 \*\*

---

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

Residual standard error: 4.196 on 187 degrees of freedom

Multiple R-squared: 0.2635, Adjusted R-squared: 0.2202

F-statistic: 6.082 on 11 and 187 DF, p-value: 1.742e-08