A professor is looking to better understand which variables impact student grades. He has provided you with student data and metadata from his classes dating back to 2019. The metadata specifies which categories to use as references and emphasizes that all percentages should be calculated as decimals. He has asked that you use an alpha of 1% throughout the analysis. Use this database to complete the following analyses:

Simple Regression Analysis:

Complete a simple regression analysis using final exam to predict course grade.

Multiple Regression Analysis:

Complete a multiple regression analysis to predict course grade using all variables provided. Remember to check the metadata tab to see how the indicator variables should be coded.

Parametric or Nonparametric Analysis:

Choose the appropriate parametric or nonparametric analysis to answer the following: Is there a difference in course grade based on year?

Midterm Exam Rubric

Executive Summary Format: 3 pts

(block format with 5 required discussion items)

Spelling/Grammar/Writing (limited statistical jargon): 15 pts

Executive Summary Content:

Statement of problem: 4 pts

(purpose of project, creativity allowed)

Methods: 4 pts

(variable description, statistical methods used, explanation of nonparametric test used)

Results: 16 pts \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Simple Regression:

Appropriate coefficient of determination reported and interpreted (2) Correlation coefficient reported and interpreted (1)

Regression coefficient interpreted (1)

Comparison to actual data using the observation for validation provided (1)

Multiple Regression

Expected results (1)

Appropriate coefficients of determination reported and interpreted (3) Regression coefficients interpreted (2)

Comparison to actual data using the observation for validation provided (1) Comparison of multiple regression model to simple regression model (1)

Nonparametric results (3)

Conclusions and recommendations: 5 points Limitations: 3 pts

Total: 50 pts

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Class** | **Class Attendance** | **Final Exam** | **Course Grade** |  |  | **Observation for validation** | | |  |  |  |
| 2021 | In-Person | 1 | 0.9545 | 0.994301667 |  |  | **Year** | **Class** | **Class Attendance** | **Final Exam** | **Course Grade** |  |
| 2021 | In-Person | 1 | 0.9659 | 0.9915 |  |  | 2021 | Online | 1 | 0.9437 | 0.9728 |  |
| 2021 | In-Person | 0.9545 | 0.9432 | 0.98963936 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.9261 | 0.987245897 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.983 | 0.9858 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.9489 | 0.98295 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9438776 | 0.981255926 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9795918 | 0.979976805 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.9545 | 0.976792325 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.858 | 0.976398333 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9336735 | 0.975456829 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.875 | 0.973776667 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.8807 | 0.973419231 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.875 | 0.973047727 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.946 | 0.972559615 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9438776 | 0.971990542 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.8977 | 0.971675256 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9795918 | 0.971041805 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.9375 | 0.968639359 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.858 | 0.967037179 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.8523 | 0.964085513 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9744898 | 0.961972449 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.8239 | 0.961237179 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.8977 | 0.959758333 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.8977 | 0.959026282 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.9091 | 0.958842179 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.8466 | 0.958233333 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.9205 | 0.957942949 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9693878 | 0.957163734 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.8352 | 0.954628846 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.8 | 0.9716 | 0.954523718 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.983606557 | 0.9034 | 0.953853552 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.833 | 0.951866667 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.9318 | 0.950504487 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.9375 | 0.949528308 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9540816 | 0.94608387 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9545 | 0.8523 | 0.944373718 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9545 | 0.9261 | 0.942763445 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.9006 | 0.942559615 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.953846154 | 0.875 | 0.942193357 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.7273 | 0.892 | 0.941885 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.7955 | 0.939279487 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.8523 | 0.938544744 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9311224 | 0.93756074 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.8852041 | 0.935824097 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.8125 | 0.933667378 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.7898 | 0.931128205 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.770491803 | 0.9176 | 0.92063947 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.8182 | 0.920080385 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.858 | 0.916832692 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.6818 | 0.8466 | 0.915793333 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.969230769 | 0.8693 | 0.914616084 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.7727 | 0.914613505 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.8125 | 0.909183182 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.969230769 | 0.8068 | 0.908749359 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.9091 | 0.733 | 0.905295 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.880102 | 0.904370382 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.5 | 0.9642857 | 0.903038223 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.6683673 | 0.901591837 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.907692308 | 0.7784 | 0.89918141 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0 | 0.9438776 | 0.89805208 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.9285714 | 0.898033242 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.950819672 | 0.9545 | 0.897850399 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.8443878 | 0.896171939 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.950819672 | 0.8295 | 0.895227939 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.9 | 0.7831633 | 0.894367098 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9545 | 0.7841 | 0.888842413 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.7216 | 0.887661282 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.6307 | 0.88591141 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.8636 | 0.9205 | 0.882989359 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.6591 | 0.882375513 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.8182 | 0.6989 | 0.880839114 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.8852041 | 0.880283713 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.625 | 0.874637179 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.2 | 0.9183673 | 0.872411709 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.7372449 | 0.868857378 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.4602 | 0.868746096 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9091 | 0.7045 | 0.866877564 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.5511 | 0.865812949 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.7841 | 0.864560513 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.5795 | 0.863779615 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.9545 | 0.5455 | 0.863502179 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.8928571 | 0.860381209 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.7813 | 0.859689359 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.9091 | 0.8409 | 0.859267564 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.6760204 | 0.853683564 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.6364 | 0.8722 | 0.852421667 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.6534 | 0.849090443 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.9 | 0.8188776 | 0.839098234 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.5511 | 0.838013205 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.4318 | 0.837062179 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.4773 | 0.836353543 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9091 | 0.7216 | 0.830213205 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.4091 | 0.827308333 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.6932 | 0.826823205 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.4545 | 0.820525107 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.7193878 | 0.818931554 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.5455 | 0.81525859 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.7 | 0.7285714 | 0.807517857 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.5398 | 0.799033333 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.015384615 | 0.7898 | 0.797345396 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.5568 | 0.790419513 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.5867347 | 0.789939443 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.6 | 0.8520408 | 0.78204546 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.505102 | 0.780044741 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.7755102 | 0.777493192 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.5816327 | 0.769458163 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.6648 | 0.768630513 |  |  |  |  |  |  |  |  |
| 2021 | Online | 1 | 0.2898 | 0.762516667 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.8 | 0.5918367 | 0.760242773 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.7270408 | 0.758515589 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.3466 | 0.756611642 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.2955 | 0.756478846 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.6862245 | 0.754781763 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.5357143 | 0.753028571 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.016393443 | 0.3977 | 0.751687042 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.953846154 | 0.3068 | 0.748096958 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.5114 | 0.747081046 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.969230769 | 0.6932 | 0.743816026 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0 | 0.5227 | 0.743226923 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.4489 | 0.741742436 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.2614 | 0.732895513 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0 | 0.6734694 | 0.718343244 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.5 | 0.6364 | 0.711040734 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.3673469 | 0.702682889 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.377551 | 0.694576345 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.375 | 0.692131457 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.6071429 | 0.683469689 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9545 | 0.4545 | 0.681420128 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.9545 | 0.3636 | 0.677569697 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.953846154 | 0.125 | 0.672994872 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.967213115 | 0.7841 | 0.667509446 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9545 | 0.2898 | 0.661160256 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.5909 | 0.5284 | 0.652766235 |  |  |  |  |  |  |  |  |
| 2020 | Online | 1 | 0.0227 | 0.647144231 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9 | 0.1875 | 0.646776923 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.8 | 0.4061224 | 0.629876125 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.983606557 | 0.3636 | 0.626788167 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.9545 | 0.2386 | 0.62144359 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.938461538 | 0.4545 | 0.609638869 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0 | 0.602005769 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9474 | 0 | 0.600919103 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.5637755 | 0.592443878 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.5455 | 0.3409 | 0.581433171 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.8638 | 0 | 0.574467051 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.786885246 | 0 | 0.57187593 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.984615385 | 0.1477 | 0.569462179 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.3112245 | 0.567225353 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.0966 | 0.564512821 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0.5918367 | 0.558953414 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.938461538 | 0 | 0.546167949 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 1 | 0.2841 | 0.546157459 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.8636 | 0 | 0.540039814 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.7273 | 0 | 0.526229615 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9545 | 0.4034 | 0.504845513 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.7373 | 0 | 0.502502611 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.5 | 0 | 0.490065 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.661538462 | 0 | 0.485823368 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.5 | 0 | 0.471937378 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.6364 | 0.1591 | 0.464506515 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 1 | 0 | 0.462324615 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.430769231 | 0 | 0.461863718 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.7727 | 0 | 0.448703019 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.892307692 | 0 | 0.447728974 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.5 | 0 | 0.445871096 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.68852459 | 0 | 0.442287277 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 1 | 0.1591 | 0.431154545 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0 | 0.3418367 | 0.423748286 |  |  |  |  |  |  |  |  |
| 2020 | Online | 0.524590164 | 0 | 0.419249626 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.3 | 0.255102 | 0.413514613 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.8636 | 0.3409 | 0.409580466 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.4545 | 0 | 0.391303869 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.7727 | 0 | 0.379302937 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.9091 | 0 | 0.361227051 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.5 | 0 | 0.351518415 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.830769231 | 0.1023 | 0.338212821 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.3 | 0 | 0.338070513 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.4 | 0 | 0.320635956 |  |  |  |  |  |  |  |  |
| 2021 | In-Person | 0.6364 | 0 | 0.300604219 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0.953846154 | 0.0227 | 0.239778147 |  |  |  |  |  |  |  |  |
| 2021 | Online | 0 | 0 | 0.225083333 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0.3 | 0 | 0.172230769 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0.3182 | 0 | 0.125844872 |  |  |  |  |  |  |  |  |
| 2019 | In-Person | 0 | 0 | 0.113925 |  |  |  |  |  |  |  |  |
| 2020 | In-Person | 0 | 0 | 0.097375 |  |  |  |  |  |  |  |  |

Metdata

|  |  |
| --- | --- |
| **Variable** | **Definition** |
| Year | The year a student took the course Use 2019 as the reference |
| Class | The type of class offered Use In-person as reference |
| Class Attendance | Percentage (as a decimal) earned for class attendance |
| Final Exam | Percentage (as a decimal) earned on final exam |
| Course Grade | Percentage (as a decimal) earned overall for course |
|  |  |