



Full Name : \_\_\_\_\_ Student ID: \_\_\_\_\_

Grade Table (for Lecturer use only)

Question	Points	Score
1	20	
2	30	
3	50	
Total:	100	

### Instructions for Midterm Exam

Welcome to the midterm exam of EEE483 - Introduction to Energy Analytics (I2EA) and good luck!

Please read the following rules and confirm by signing that you have read and understood the rules before you receive your exam:

- The midterm exam should be conducted between 10:15 and 12:00. Exam duration is 105 minutes. Students must finalise the exam by delivering it before 12:00. Students are not allowed to leave the exam in the first 30 minutes.
- Student ID cards should visibly be on the edge of desks till the end of the exam. Students without the student ID cards or Turkish identity cards should not be participated into the exam.
- This is a closed-book exam which means that students are not allowed to take notes, books, or any other reference material into the exam. Throughout the exam, students should not possess mobile phones and electronic devices that are capable of storing, receiving or transmitting information or electronic signals, such as computerised watches.
- Students are not allowed to take a glance at the exam questions until told to do so. Students should not communicate with any other student under any circumstances during the exam period. A student, who cheats, tries to cheat during the exam, or is identified to be cheating after investigating exam documents, is given 0 (zero) for that exam and a disciplinary investigation is opened against the student.
- An incorrect answer to a question is awarded no marks with no consideration of any partial credit. Therefore, no partial credit will be given.

In recognition of and in the spirit of the above rules which constitute Adana Alparslan Türkeş Science and Technology University Honour Code, I certify that I will neither give nor receive unpermitted aid on this examination.

Signature: \_\_\_\_\_



1. (a) **(5 points)** Match the name of Tidyverse packages with the appropriate descriptions.

- |                  |                       |
|------------------|-----------------------|
| 1. dplyr ( )     | a. Data Visualisation |
| 2. tidyr ( )     | b. Data Import        |
| 3. ggplot2 ( )   | c. Data Manipulation  |
| 4. readr ( )     | d. Date and Time      |
| 5. lubridate ( ) | e. Data Organising    |

(b) **(5 points)** Which of the following functions can be used to create correlation map? Select all that apply.

- `corrplot::corrplot()`
- `ggstatsplot::ggcorrmat()`
- `PerformanceAnalytics::chart.Correlation()`
- `ggplot2::geom_tile()`
- `GGally::ggpairs()`

(c) **(10 points)** What is the electrical efficiency of a coal-fired power plant that produces 740 MW of electricity from 8,000 tonnes per day of coal? Note that the coal has a calorific value of 22 GJ/t.

2. Download the file named as “people-without-electricity-country.csv” in “Number of people without electricity” data set from Kaggle data sets and answer the following questions by using the downloaded file along with emphasising R codes.

(a) **(10 points)** Plot a graph with red coloured double-sized path geometry that demonstrates the number of people without electricity access in Turkey versus years between 1990 and 2020 in accordance with the followings:

- Name of y-axis should be “People without Electricity Access”,
- x-axis name should not exist,
- Title of the plot should be Turkey.



(b) **(10 points)** Find the number of entities in which the number of people without electricity access equals to zero for all years.

(c) **(10 points)** Find the Top25 countries of the year 2016 from the viewpoint of the number of people without electricity access.

3. Download the file named as “PTF-01012016-31122019.csv” in “Electricity Prices of Turkey” data set from Kaggle data sets and answer the following questions by using the downloaded file along with emphasising R codes.

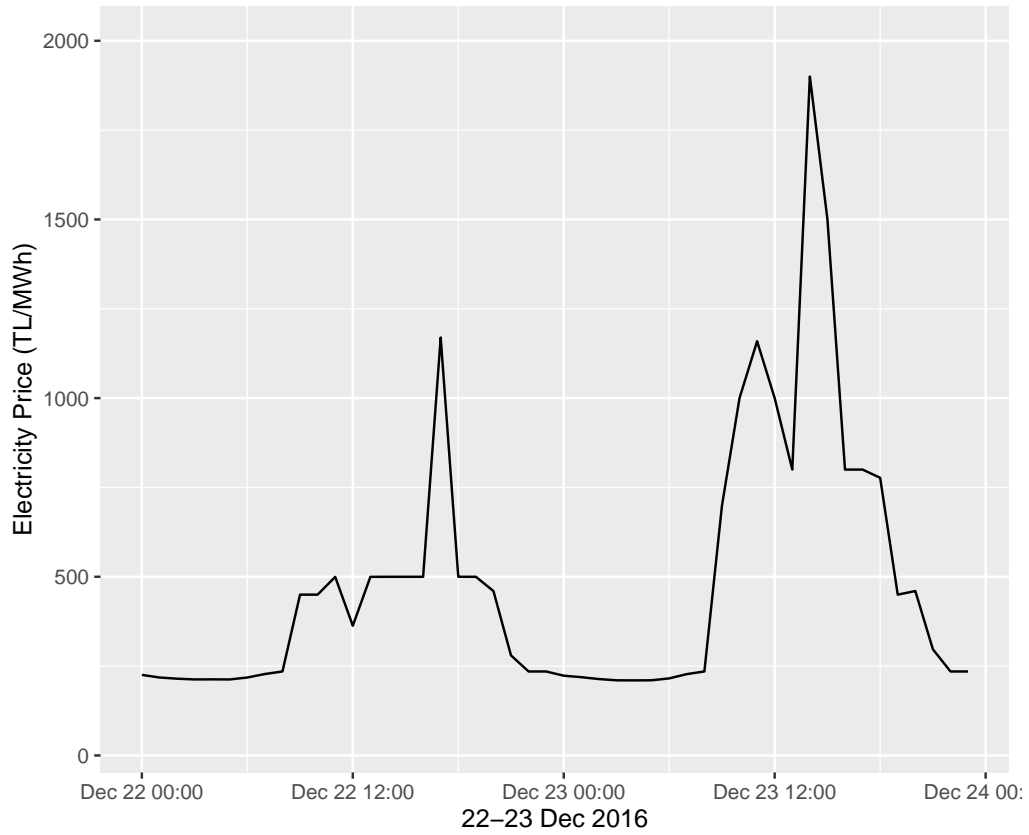
(a) **(10 points)** Write down R codes to import “PTF-01012016-31122019.csv” into RStudio as a tibble named as price by using read\_delim() function.



- (b) **(10 points)** Check the values in PTF (TL/MWh) column with row numbers 8562, 8580, 8583, and 8584, and report anything wrong. If there is something wrong, explain how you can handle this problem.



(c) (15 points) Write down R codes to make required data manipulation in order to plot a similar graph shown below.





- (d) (15 points) Write down R codes to make required data manipulation in order to plot a correlation map with Pearson correlation and fill the below table.

<b>Pearson Correlation</b>	<b>PTF (TL/MWh)</b>
PTF (USD/MWh)	
PTF (EUR/MWh)	
Year	
Month	
Day of Month	
Day of Week	
Hour of Day	