SECTION B

Figures 1–3 relate to the daily use of public transport in Canberra, from July 2019 – March 2024. The variable plotted is the total number of passenger boardings each day on all forms of public transport except for school buses.

1. *Using Figures 1–2, describe the daily passenger boardings for public transport in Canberra. Canberra had two major periods of "COVID-19 lockdowns" where there was substantially reduced travel, and has four school terms per year. Carefully comment on the interesting features of both plots, and how the lockdowns, school terms and other holidays are evident.*

    - There is strong weekly seasonality with lower boarding numbers on weekends, seen in Figure 1 but more clearly in Figure 2. 1
    - Some Mondays (Fig 2) have lower boarding numbers, probably associated with long weekends. 1
    - Fig 1 shows there is also some annual seasonality, with low boarding numbers at the end of the year and the beginning of the next year (summer holidays). 1
    - The school holidays (incl Easter) have a noticeable effect with lower boarding numbers during the holidays/terms breaks. 1
    - The two COVID-19 lockdowns are visible in the first half of 2020, and the second half of 2021. 1

2. *For the STL decomposition shown in Figure 3, discuss what is shown in each panel. Why has a log transformation been used? Describe how COVID-19 lockdowns and holidays have affected the trend, seasonal and remainder components.*

    - The top panel shows the transformed data, which is the log of the original data. 1
    - The next panels show the trend, weekly seasonality, annual seasonality and the remainder components. 1
    - The log transformation is used to stabilize the variance of the data. 1
    - The lockdowns are seen in the two large dips in the trend. 1
    - The holidays have mostly been put into the annual seasonal component and the remainder component. 1