The University of Nottingham

SCHOOL OF MATHEMATICAL SCIENCES

SPRING SEMESTER 2023-2024

MATH3026 - TIME SERIES ANALYSIS

Coursework Assignment 2

Deadline: 14:00, Monday 29/04/2024

Your neat, clearly-legible solutions should be submitted electronically as a pdf file via the MATH3026 Moodle page by the deadline indicated there. When typing your answers, a font **NO SMALLER** than size 11 points should be used.

Solutions to all questions should be combined into one pdf file and your submitted file should be named as follows:

'STUDENTNUMBER-MATH3026-CW2.pdf'.

Here, STUDENTNUMBER should be replaced with your student number. For example, if my student number is 1234567, then I would save this file as

'1234567-MATH3026-CW2.pdf'

You should also include your name on the first page of your submitted work.

As this work is assessed, your submission must be entirely your own work (see the University's policy on Academic Misconduct).

Submissions up to five working days late will be subject to a penalty of 5% of the maximum mark per working day.

Deadline extensions due to Support Plans and Extenuating Circumstances can be requested according to School and University policies, as applicable to this module. Because of these policies, solutions (where appropriate) and feedback cannot normally be released earlier than 10 working days after the main cohort submission deadline.

ANSWER ALL QUESTIONS

1. The datasets `nhtemp.rda` and `JJ_data.rda` can be found in the 'MATH3026 - Assessed Coursework 2' section of the MATH3026 moodle page. Brief descriptions of these datasets are provided in the table below.

Dataset	Description
`nhtemp`	A time series of the annual mean temperature in degrees Fahrenheit in New Haven, Connecticut, USA, from 1912 to 1971.
`JJ_data`	A time series of the quarterly earnings (in $ USD) of one Johnson & Johnson share from 1970 to 1980.

Assuming that you have set the working directory in R to be that in which these datasets are stored, the datasets may be loaded into R using the commands `load("nhtemp.rda")` and `load("JJ_data.rda")`.

For each of the datasets

(a) `nhtemp`;

(b) `JJ_data`;

your task is to:

Analyse the dataset by producing a suitable time series model to describe the data. You should write a short report to describe how you have identified and checked the fit of your chosen model and the equation of your final fitted model should be included in your report.

Please note, there is no unique, correct, solution to this task. Credit will awarded for appropriate justification and explanation of your model choices and communication of your results.

For each dataset:

Your report on the dataset analysis should be no longer than **SIX** A4 pages in length, including all plots and/or tables. The R code used to produce your report should be suitably commented and included at the end of your report as an appendix for marking. This appendix is not included in the six-page limit. Please note: this does not imply that a wholly correct answer to each task would require six pages of work. Credit will be given for concise answers that convey important details of your work without too much repetition or excessive length.

For each dataset ((a) and (b)) this task will marked out of 10 with marks allocated as follows:

Technical content, appropriate methods and justification of your modelling:	4 Marks
Overall presentation, writing and interpretation:	4 Marks
Correct and appropriately commented R code:	2 Marks