Mini Case 2

Eli Orchid has designed a new pharmaceutical product, Orchid Relief, which improves the night sleep. Before initiating mass production of the product, Eli Orchid has been market-testing Orchid Relief in Orange County over the past 8 weeks. The daily demand values are recorded in the Excel file provided. Eli Orchid plans on using the sales data to predict sales for the upcoming week. An accurate forecast would be helpful in making arrangements for the company's production processes and designing promotions.

The COO of the company approved the initial analysis and asked for the following extensions[1]:

<table>
<tr>
<td>To fit a new multiple regression model with dummy variables for weekdays (not the weekend), and to provide the regression equation (d = a*t + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + c), along with Adjusted R^2.</td>
<td>d = 315.0262 + 0.7163t + 116.7679w
Adjusted R^2= 0.8186</td>
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<td>To use all three models:

• M1: d = 1.0356t + 339.29
• M2: d = 0.7163t + 116.7679w + 315.0262
• M3: (the one considering weekdays)

to predict the demand for seven days ahead (Mon, Tue, …, Sun) and find the total weekly demand.</td>
<td>
<table>
<tr><th></th><th>M1</th><th>M2</th><th>M3</th></tr>
<tr><td>Mon.</td><td>398.3192</td><td>355.8553</td><td>317.7591</td></tr>
<tr><td>Tue.</td><td>399.3548</td><td>356.5716</td><td>320.3918</td></tr>
<tr><td>Wed.</td><td>400.3904</td><td>357.2879</td><td>355.6791</td></tr>
<tr><td>Thu.</td><td>401.426</td><td>358.0042</td><td>342.8661</td></tr>
<tr><td>Fri.</td><td>402.4616</td><td>358.7205</td><td>387.0337</td></tr>
<tr><td>Sat.</td><td>403.4972</td><td>476.2047</td><td>475.1139</td></tr>
<tr><td>Sun.</td><td>404.5328</td><td>476.921</td><td>474.2611</td></tr>
<tr><td>TOTAL:</td><td>2809.982</td><td>2739.5652</td><td>2673.1048</td></tr>
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<tr>
<td>Take advantage of the fact that new demand data became available and use this new data to compare the forecasts using MAPE for days 57-63.</td>
<td>New: M: 311 T: 341 W: 357 Th: 363 F: 390 Sa: 490 Su: 492
$MAPE_{M1}$: 13.81908
$MAPE_{M2}$: 5.576855
$MAPE_{M3}$: 4.491936</td>
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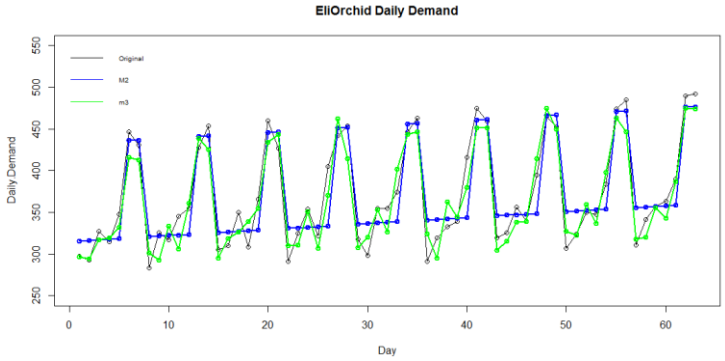
<tr>
<td>To provide a line chart with the actual demand (including the new data) and M2 and M3.</td>
<td> 
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</table>

[1] Round numbers to four decimal points (e.g. 0.1234), unless explicitly requested otherwise.

To choose the best model for forecasting daily demand at Orchid Relief for 7 days ahead and write a short paragraph explaining your choice. Note: this paragraph can be on page 2. The answers to previous questions must all fit on the first page.	[write your paragraph here] I choose M3 as the best model.There are two reasons: 1. It's the lowest MAPE result amonge M1,M2,M3 models. 2. It is the best fit of the actual demond from the line chart. M3 is ARIMA(6,1,0) model.