# 10.4 Forecasting

Name: _____ Class: _____ Date: _____ **Total: 15 marks**

**KEY WORDS** moving average • mean absolute deviation

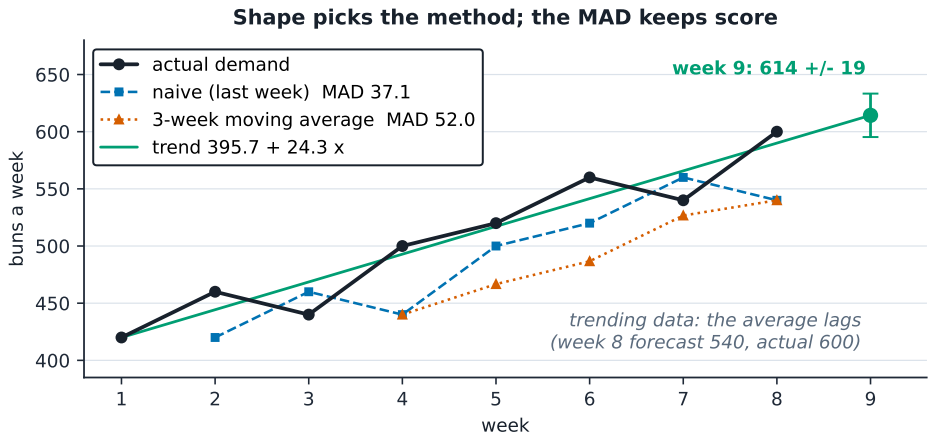
## Objective

Run naive, moving-average, smoothing and trend forecasts, and score them with the MAD on the same weeks.

## 1 Key knowledge and worked examples

### ■ Methods and the scoreboard

Naive $F_{t+1} = A_t$. Moving average of the last $n$. Smoothing $F_{t+1} = F_t + \alpha(A_t - F_t)$. Trend by least squares. $MAD = \text{mean}|A - F|$ - compare on the same weeks.




*Shape picks the method; the MAD keeps score*

### ■ Worked example. Bun demand

Naive MAD 37.1, MA3 52.0, ES(0.4) 48.3 ✓; trend $395.7 + 24.3x$ gives 614 for week 9 ✓.

## 2 Practice

Coffee sales, six weeks: 300, 330, 320, 360, 350, 390.

**2.1** Naive forecasts for weeks 2-6, the errors and the MAD. [3]

**2.2** Three-week moving averages for weeks 4-6, the errors and the MAD. [4]

**2.3** Exponential smoothing, $\alpha = 0.5$, seed 300: forecasts for weeks 2-7 and the MAD over weeks 2-6. [4]

**2.4** The least-squares trend (slope to two decimals) and its week-7 forecast. Which method would you quote, and why? [4]

## Solutions

**2.1**

- Forecasts 300, 330, 320, 360, 350; errors 30, -10, 40, -10, 40.
- $MAD = 130/5 = 26.0$.

**2.2**

- 316.7, 336.7, 343.3 against 360, 350, 390.
- Errors 43.3, 13.3, 46.7; $MAD = 103.3/3 = 34.4$.

**2.3**

- 300, 315, 317.5, 338.75, 344.4; week 7: 367.2.
- Errors 30, 5, 42.5, 11.25, 45.6; $MAD = 26.9$.

**2.4**

- $\hat{y} = 286.7 + 15.71x$; week 7 = 396.7.
- The series trends about 16 a week; the average (34.4) and smoothing (26.9) lag it - quote the trend, with the naive MAD 26 as the band.

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