

**Topic: Hypothesis Testing for correlation****Day 7 Question 1**

The Mercalli scale and the Richter scale are both used to measure earthquakes. The Mercalli scale is based on structural damage to buildings and the Richter scale is based on the amplitude of the ground vibrations. The table shows data from eight earthquakes.

<b>Mercalli intensity, <math>M</math></b>	9	7	8	6	5	8	6	8
<b>Richter magnitude, <math>R</math></b>	6.3	5.3	6.0	5.5	4.0	5.4	4.7	7.1

- a** Calculate, to 3 decimal places, the product moment correlation coefficient between  $M$  and  $R$ . **(1 mark)**

It is suggested that there is linear correlation between the structural damage and ground vibrations caused by an earthquake.

- b** Test this suggestion at the 1% significance level, stating your null and alternative hypotheses clearly. **(3 mark)**

**Day 7 Question 2**

The table shows the engine sizes,  $E$  litres, and fuel economies,  $M$  miles per gallon, for a sample of six cars.

<b>Engine size, <math>E</math> (litres)</b>	3.8	5.7	2.4	3.4	2.2	2.4
<b>Fuel economy, <math>M</math> (mpg)</b>	30	28	30	28	34	33

- a** Calculate the product moment correlation coefficient for these data, correct to 3 significant figures.
- b** For these data, test  $H_0: \rho = 0$  against  $H_1: \rho \neq 0$ , using a 5% significance level.