

Do not write  
in this margin

### Question 26

A researcher measured the phosphate level in the blood of a kidney dialysis patient on a sample of six occasions. The resulting data (in milligrams per decilitre) were

5.6 5.1 4.6 4.8 5.7 6.4.

The sample mean and standard deviation are 5.37 and 0.665 respectively. Assuming that the variability in the patients' blood phosphate level can be adequately modelled by a normal distribution, calculate a 90% confidence interval for the patient's mean blood phosphate level.

[3]

$$\begin{aligned} (U_-, U_+) &= \left( \bar{x} - \frac{t_{\alpha/2}}{\sqrt{n}}, \bar{x} + \frac{t_{\alpha/2}}{\sqrt{n}} \right) \\ &= 5.37 - \frac{2.015 \times 0.665}{\sqrt{6}}, 5.37 + \frac{2.015 \times 0.665}{\sqrt{6}} \\ &= 4.823, 5.917 \end{aligned}$$

### Question 27

A list of Before - After differences was found to be

1.94 1.64 -0.07 0.48 1.27 -0.18 2.14 -0.12

The sample mean is 0.8875 and the sample standard deviation is 0.973. Carry out a test of zero difference between Before and After population means using these data, and report your conclusions. (You may assume that the population of differences has a normal distribution.)

[5]

$$t(n-1) \approx \frac{\bar{D}}{S/\sqrt{n}} = \frac{0.8875}{0.973/\sqrt{8}} = 2.58$$