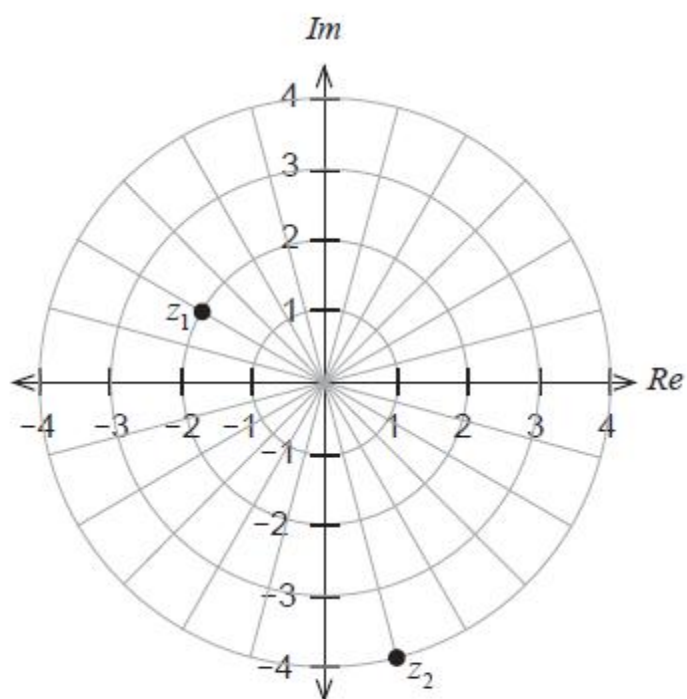**Question 11** (9 marks)

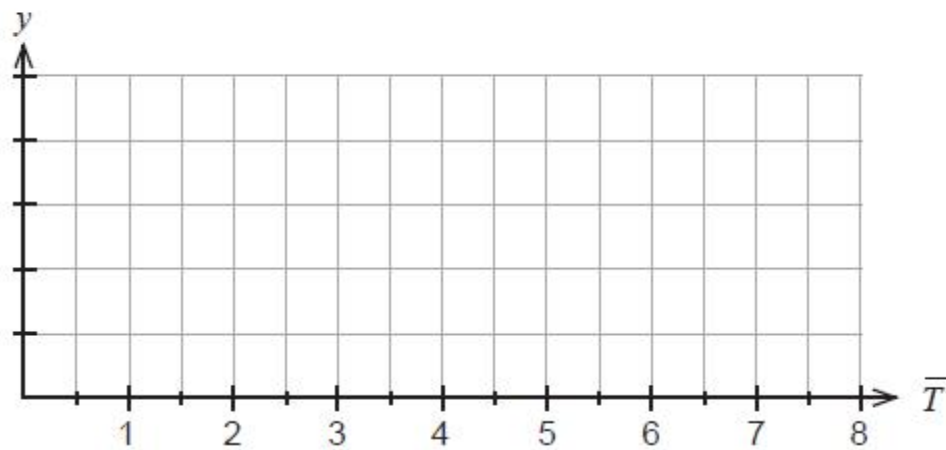Two complex numbers z_1 and z_2 are shown in the Argand plane below.

(a)   Write the expression for z_1 in exact polar form. (2 marks)

(b)   Develop an expression for the volume of the spherical cap in terms of h.   (4 marks)

(b)   Sketch the likely distribution of the sample mean $\bar{T}$ (for samples of size 64) on the axes below.   (2 marks)

Anika, a teacher at the TekNoCrat School, theorises that as teenagers tend to check their text messages more frequently than adults, then the population mean response time for teenagers will be much lower than the population mean adult response time $\mu = 3$.

Anika is then presented with the sample mean response time for a sample gathered from an unknown source.

Sample size	Sample mean (hours)	Sample standard deviation (hours)
100	2.1	2.7

(b)   Using the equations formed, determine the total cost for a group consisting of 1 child
        accompanied by 2 pensioners.   (2 marks)

(c)   Solve simultaneously the equations formulated in part (a).   (2 marks)