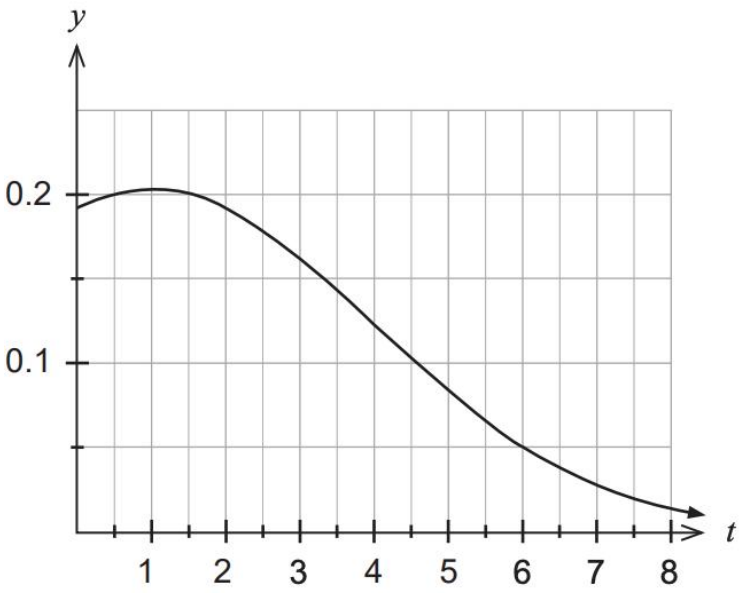
Question 15 **(9 marks)**

An experiment was conducted to measure how quickly adults respond to the request: 'send me a text message'.

Let T = the number of hours taken for an adult to respond and send a text message.

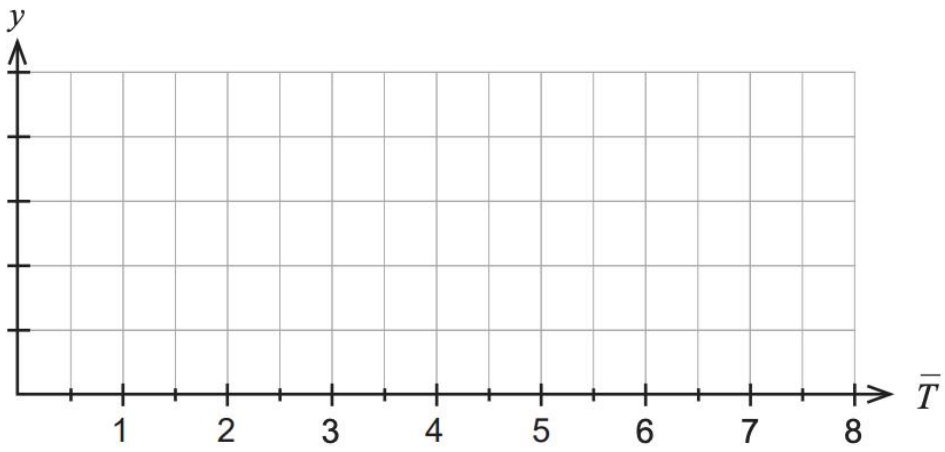
It was found that the distribution of the population of response times for adults was given by the probability density function shown below, with mean $\mu = 3$ hours and standard deviation $\sigma = 2.4$ hours.



Random samples of size 64 are drawn repeatedly from the population of response times and the sample mean response time $\overline{T}$ is determined for each sample.

(a) Calculate, correct to 0.001, the probability that a sample mean response time will be between 150 minutes and 210 minutes. (3 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

Calculations are performed and Anika concludes by stating: 'this sample was clearly not taken from the population of adult response times. It is highly likely that this sample was taken from a sample of 100 teenagers'.

(c) Perform the necessary calculations and comment on Anika's claim. (4 marks)