

This homework runs from Thursday 14 November 2024 until 12 noon on Thursday 21 November 2024. Submission is to Gradescope Homework 6.

You should aim to write out solutions that someone who does not already know the answer could follow and understand.

Please remember the good scholarly practice requirements of the University regarding work for credit. You can find guidance at the School page <https://web.inf.ed.ac.uk/infweb/admin/policies/academic-misconduct>. This also has links to the relevant University pages.

Question 1

A sphere has radius R centimetres, where R is a continuous random variable with the following cumulative distribution function (CDF).

$$F_R(x) = \begin{cases} 0 & x < 1 \\ (x^2 - 1)/48 & 1 \leq x \leq 7 \\ 1 & 7 < x \end{cases}$$

Calculate the following, showing your working in each case.

- (a) The probability the sphere has radius greater than 3cm.
- (b) The median value of the continuous random variable R .
- (c) The probability density function (PDF) of R .

[5 marks]

Question 2

The same sphere has surface area A cm² where continuous random variable $A = 4\pi R^2$. Calculate the following, again showing your working.

- (a) The probability that the sphere has surface area less than 64π square centimetres.
- (b) The cumulative distribution function of A .

[5 marks]