



QUESTION WORKBOOK

Taylor series

Further Pure 1 · Year FM

7 questions · 30 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Write down the Taylor series of a function f about $x = a$, as far as the term in $(x - a)^2$. [2]

A2 Find the Taylor series of e^x about $x = 1$, up to the term in $(x - 1)^2$. [3]

SECTION B · Standard

B1 Expand $\ln x$ in ascending powers of $(x - 1)$, up to the term in $(x - 1)^3$, and use it to estimate $\ln 1.1$. [5]

- B2** Find the Taylor series of $\tan x$ about $x = \pi/4$ up to the term in $(x - \pi/4)^2$, and estimate $\tan(\pi/4 + 0.1)$ to 2 decimal places. [5]

- B3** Explain why a Taylor series anchored at $x = a$ is generally more accurate near a than a Maclaurin series would be, when a is far from the origin. [3]

- B4** Expand $\sqrt{x}$ about $x = 9$ up to the term in $(x - 9)^2$, and use it to estimate $\sqrt{9.6}$ to 3 decimal places. [5]

SECTION C · Stretch

- C1** y satisfies $dy/dx = x + y^2$ with $y = 1$ at $x = 1$. Find the Taylor series solution for y in ascending powers of $(x - 1)$, up to and including the term in $(x - 1)^3$. [7]