

Enhanced FP2 Examination (Edexcel)

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Rules

Allowed time: 1 hour 30 minutes.

Answer all questions.

This is an enhanced examination paper for the further mathematics module *Further Pure Mathematics 2*. It is meant to be a significantly more challenging examination of general concepts specified by Edexcel. It is fully doable for students with knowledge of standard A-level mathematics and further mathematics.

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- 1 Calculate $\int e^{-x} \cos x \, dx$.
- 2 Solve $\frac{dy}{dx} + y \tan x = \sin x$, given that $y(0) = 0$.
- 3 Find values of x for which $1 - x - x^2 > \frac{2}{x}$.
- 4 Use Taylor series to show that a truncated solution to $\frac{d^2y}{dx^2} + y^2 \frac{dy}{dx} = x$ is

$$y \approx (x - 1) + \frac{1}{2!} (x - 1)^2 + \frac{1}{3!} (x - 1)^3$$

given that $y(1) = 0$ and $y'(1) = 1$.

- 5 Sketch the locus $|z - 1| = |z - 2 + i|$ on an Argand diagram.
- 6 Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = \sin x$ given that $y(0) = 0$ and $y'(0) = 0$.
- 7 In this question, $r = e^\theta \sin \theta$.
 - (a) Find the points on r where tangent lines are horizontal.
 - (b) Sketch r for $0 < \theta < \frac{\pi}{2}$.
- 8 Evaluate the sum

$$\sum_{r=5}^{25} \frac{2}{(r-3)(r-1)}$$