



QUESTION WORKBOOK

Functions of two variables

Further Pure 2 · Year FM

9 questions · 38 marks

PRINT EDITION

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SECTION A · Warm-up**A1**
FT-A1For $f(x, y) = x^2y^3 + 5x$, find f_x and f_y .

[3]

A2
FT-A2A surface has equation $z = x^2 + 3y^2$. Write down the section along $x = 2$, and describe the contour at $z = 12$.

[3]

A3
FT-A3For $f(x, y) = x^3 + 2x^2y - y^4$, find the four second partial derivatives, and verify that the mixed ones agree.

[4]

SECTION B · Standard

B1
FT-B1Find the stationary point of $f(x, y) = x^2 + y^2 - 4x + 6y + 3$ and determine its nature.

[4]

B2
FT-B2Find the four stationary points of $f(x, y) = x^3 - 3x + y^3 - 3y$ and classify each one.

[6]

B3
FT-B3Find the equation of the tangent plane to $z = x^2y - 3y^2$ at the point where $x = 2$ and $y = 1$.

[4]

B4
FT-B4

For $f(x, y) = e^{3x} \cos y$, find f_x , f_y and f_{xy} , and evaluate f_{xy} at $(0, \pi/2)$.

[4]

SECTION C · Stretch**C1**
FT-C1

Find the stationary points of $f(x, y) = x^4 + y^4 - 4xy$ and classify each one.

[6]

C2
FT-C2

Show that the Hessian test gives no verdict at the origin for $f(x, y) = x^4 + y^4$, and determine the nature of that stationary point by another argument.

[4]

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