

Course 2E1 2005-06 (SF Engineers & MSISS & MEMS)**S h e e t 4**

Due: in the tutorial sessions next Wednesday/Thursday

Exercise 1

Find the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for a function $z = f(x, y)$ defined implicitly by the equation:

- (i) $z - z^5 = x + y^2$,
- (ii) $xyz = \sin(z)$.

Exercise 2

Calculate all partial derivatives of the second order for the following functions:

- (i) $f(x, y) = (xy)^3 + \frac{5^x}{x}$,
- (ii) $f(x, y, z) = \cos x - y \sin x + z$.

Exercise 3

Use Chain Rule to express $\frac{dw}{dt}$ as a function of t in the following cases:

- (i) $w = x^3 + y$, $x = \cos t$, $y = \sin t$;
- (ii) $w = \frac{y}{x}$, $x = e^t$, $y = \sin t$;
- (iii) $w = \ln(x + y - z)$, $x = \cos t$, $y = \sin t$, $z = \sqrt{t}$;
- (iv) $w = z + \cos(xy)$, $x = t$, $y = \ln t$, $z = t^2$.