

TUTORIAL 3

MA1132: ADVANCED CALCULUS, HILARY 2017

- (1) Suppose that a particle travels with velocity function given for $t > 0$ by

$$v(t) = (t^2, \sqrt{2} \cdot t \log t, (\log t)^2),$$

and that at $t = 1$, the position of the particle is $r(1) = (1, 0, 3)$. Find the following.

- (a) The position function $r(t)$ for the particle.
 - (b) The the distance travelled by the particle from $t = 1$ to $t = 2$.
 - (c) The acceleration function $a(t)$.
- (2) Determine whether or not the following limit exists, and if it does, find its value:

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x + 2 \sin y}{x + y}.$$

- (3) Sketch the domains of the following functions and determine whether they are open sets or not.

(a)

$$f(x, y) = \log \left(1 - \sqrt{x^2 - 4x + y^2 + 4} \right).$$

(b)

$$f(x, y) = \frac{x + \sin y}{y + \cos x}.$$