

### Question 20

This question concerns the linear flow whose velocity function is

$$V(x, y) = (2x + 5y, -2x).$$

(a) Write down

(i) the matrix  $A$  of the flow;

(ii) the first order differential equations satisfied by the co-ordinate functions  $f$  and  $g$  of any flow function  $\alpha = (f, g)$  for this flow;

(iii) a second order differential equation satisfied by both  $f$  and  $g$ .

[3]

(b) Find the general solution of the differential equation in part (a) (iii).

[3]

(c) Determine the flow function  $\alpha$  for  $V$  that satisfies  $\alpha(0) = (1, -2)$ .

[4]

Questions 11 R, 12 R and 19 R opposite are for **RESIT STUDENTS ONLY**.