13Z

(a) Solve the equation

$$\frac{dy}{dx} = \frac{y^2 + xy}{x^2}.$$

[6]

(b) Show that

$$(x + y)\,dx + x\,dy$$

is an exact differential, and use this to obtain the general solution of

$$x\,\frac{dy}{dx} + x + y = 0.$$

[7]

(c) Solve the equation

$$\frac{dy}{dx} + ky = a \sin mx$$

subject to the boundary condition $y = 1$ when $x = 0$, where k, m and a are real, non-zero, constants. [7]