5 **(a)** Find the general solution of the differential equation

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = \sin 2x + \cos 2x. \qquad [7]$$

(b) For large positive values of x and for any initial conditions, show that the solution to part **(a)** can be approximated by

$$y \approx R\sin(2x - \phi),$$

where R and ϕ are positive constants to be determined. [3]