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

$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = 5\cos x.$$ [7]

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

$$y \approx R\sin(x+\phi),$$

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