PARTIAL DIFFERENTIAL EQUATIONS
Quiz 1, time 15 minutes

Instructor: James Vickers

Your name:_____

Date: Wednesday 6th November

1. **(a)** [3 marks] Find the *general solution* of the homogeneous differential equation

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$$

(b) [3 marks] Find a *particular solution* of the inhomogeneous differential equation

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} \tag{1}$$

using any method you like.

(c) [2 marks] Hence find the general solution of the inhomogeneous differential equation (1)

2. [3 marks] Find the general solution to the *Euler equation*

$$x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0 \tag{2}$$

using any method you like.

3. **(a)** [3 marks] A particular solution to the differential equation

$$\frac{d^2y}{dx^2} + y = 1 \tag{3}$$

is given by $y_{ps}(x) = 1$. Find the general solution.

(b) [2 marks] Can you find a solution that satisfies the boundary conditions $y(0) = 0$, $y(\pi/2) = 1$?

(c) [2 marks] Can you find a solution that satisfies the boundary conditions $y(0) = 0$, $y(\pi) = 1$?

Total 18 marks