PROBLEM SOLVING 5

1. Consider a multilayer feedforward network, all the neurons of which operate in their linear regions. Show that such a network is equivalent to a single-layer feedforward network.

2. Consider a neural network with two inputs, x_1 and x_2, and one output, y. Suppose the error for one training pattern is given by:

$$e = d \log y + (1-d)\log(1-y)$$

Where d is a constant and θ is the bias. There are two neurons in the network: one hidden neuron and one output neuron. The hidden neuron receives signals from x_1 and x_2, while the output neuron receives signals from the hidden neuron and also directly from the two inputs. The activation function, φ, used for the two neurons is differentiable. Derive expressions that yield the derivatives of e with respect to x_1 and x_2, i.e., derive expressions for $\frac{\partial e}{\partial x_1}$ and $\frac{\partial e}{\partial x_2}$.