Computation Theory

Define what is meant by saying that a set of partial recursive ($\mu R$) functions is recursively enumerable. Explain briefly how the universal register machine might be used to define a universal $\mu R$ function $\mu(e, x)$ that enumerates the set of all partial recursive functions of a single variable $x$. [6 marks]

(a) Prove that the set of all total recursive functions of a single variable is not recursively enumerable. [4 marks]

(b) Show that there are recursively enumerable sets that are not recursive. [6 marks]

(c) Show that there is a partial recursive function that cannot be extended to any total recursive function. [4 marks]

[Any properties of recursively enumerable sets that you assume should be clearly stated.]