

15 Types (AMP)

- (a) Explain briefly what is meant by the *Curry-Howard correspondence*. [3 marks]
- (b) The Calculus of Constructions (λC) is the Pure Type System whose specification has two sort symbols **Prop** and **Set**, one axiom (**Prop, Set**) and four rules (**Prop, Prop, Prop**), (**Set, Prop, Prop**), (**Prop, Set, Set**) and (**Set, Set, Set**).
- (i) Give the λC typing rule for sort symbols. [1 mark]
- (ii) Give the λC typing rules for pseudo-terms of the form $\Pi x : t (t')$ and $\lambda x : t (t')$. [4 marks]
- (c) Suppose $\Gamma \vdash A : \mathbf{Set}$ holds in λC . Give a pseudo-term Eq_A for *Leibniz equality* on A , explaining any abbreviations that you use. What is the type of Eq_A ? [5 marks]
- (d) With Γ , A and Eq_A as in part (c), give pseudo-terms $refl_A$ and $symm_A$ that have the following typings (which you do not have to prove):
- (i) $\Gamma \vdash refl_A : \Pi x : A (Eq_A x x)$ [3 marks]
- (ii) $\Gamma \vdash symm_A : \Pi x : A (\Pi y : A (Eq_A x y \rightarrow Eq_A y x))$ [4 marks]