Modal Logic
Exercise Set 11

To be completed by Thursday 25 July

1. Let $M = (W, R, D, I)$ be a non-rigid variable domain **K** model. Suppose the variable y is substitutable for x in $\varphi(x)$. Show that the formula $\langle \lambda x.\varphi(x) \rangle(y) \leftrightarrow \varphi(y)$ is valid in M.

2. Show that the formula $\langle \lambda x.(\varphi \rightarrow \psi) \rangle(t) \leftrightarrow \langle \lambda x.\varphi \rangle(t) \rightarrow \lambda x.\psi)(t)$ is valid in all non-rigid variable domain **K** models.

3. Construct a non-rigid variable domain **K** model in which $\Diamond P(c)$ is valid but $\langle \lambda x.P(x) \rangle(c)$ is not, where P is a one-place relation symbol and c is a constant.