Logic 1, WS 2007. Homework 3, given Oct 25, due Nov 8.

1. For the example given in the student-script at page 49 (subsection 5.1), evaluate the truth value $\langle P[x] \Rightarrow Q[f[x], a]\rangle^I_{x \leftarrow 2}$.

2. Prove by definition that $(\exists_x(P[x] \vee Q[x])) \Leftrightarrow ((\exists_x P[x]) \vee (\exists_x Q[x]))$.

3. Give a counterexample for $(\exists_x(P[x] \wedge Q[x])) \Leftrightarrow ((\exists_x P[x]) \wedge (\exists_x Q[x]))$.

4. Prove by definition that if $\forall_x \exists_y P[x, y]$ is satisfiable, then $\forall_x P[x, f[x]]$ is satisfiable.

5. Transform the following formula into Skolem normal form:
$\forall_x \forall_y((\exists_z P[x, y, z]) \wedge ((\exists_u Q[x, u]) \Rightarrow \exists_v Q[y, v]))$.