Automated Reasoning
The University of Edinburgh

Exercise sheet 7:
Rewriting

Exercise 1

Consider the following rewrite rules:

$$(1)\ \neg\neg A \Rightarrow A$$
$$(2)\ \neg(A \wedge B) \Rightarrow \neg A \vee \neg B$$
$$(3)\ \neg(A \vee B) \Rightarrow \neg A \wedge \neg B$$

(a) Apply one of these to the following formula. Say what *exp, sub, lhs, rhs* and ϕ are.

$$(\neg p \wedge \neg\neg q) \vee r$$

(b) Find one normal form of the following formula by applying rewrite rules to it until no more apply, *i.e* show one complete branch of the search space.

$$\neg(\neg p \wedge (q \vee \neg r))$$

Exercise 2

Show that the application of the rule:

$$X \star Y + X \star Z \Rightarrow X \star (Y + Z)$$

will terminate.

Exercise 3

Find all critical pairs of the following rewrite rule with itself:

$$\mathit{parent(parent(X))} \Rightarrow \mathit{grandparent(X)}$$

What new rewrite rule(s) do these critical pair(s) suggest?