

## CSE 311: Foundations of Computing I

### QuickCheck: Logical Translations Solutions (due Thursday, October 5)

#### 0. The Collapse of Truth Tower

Consider the following truth table:

$p$	$q$	$r$	$s$	$G(p, q, r, s)$
T	T	T	T	T
T	T	T	F	T
T	T	F	T	F
T	T	F	F	F
T	F	T	T	T
T	F	T	F	F
T	F	F	T	T
T	F	F	F	T
F	T	T	T	T
F	T	T	F	F
F	T	F	T	F
F	T	F	F	T
F	F	T	T	F
F	F	T	F	T
F	F	F	T	T
F	F	F	F	F

Write the DNF and CNF expressions for  $G(p, q, r, s)$ .

**Solution:**

$$DNF = pqrs + pqr s' + pq'rs + pq'r's + pq'r's' + p'qrs + p'qr's' + p'q'r's' + p'q'r's$$

$$CNF = (p' + q' + r + s')(p' + q' + r + s)(p' + q + r' + s)(p + q' + r' + s)(p + q' + r + s')(p + q + r' + s')(p + q + r + s)$$