

# Quiz 1

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz and all logic symbols make use of the textbook notation.

1. [3] (logic wks #1) Define the *propositions*  $p$  and  $q$  below:

$p$ :

$q$ :

- (a) [1] (§1.1 #9) Express  $p \rightarrow q$  as an English sentence.

- (b) [2] (HW1 §1.1 #2) Assume that  $p$  is false, determine if the conditional statement in part (a) is true or false. Justify yourself.

2. [4] (§1.3 #41) Find a compound proposition involving the propositional variables  $p$ ,  $q$ , and  $r$  that is true when exactly two of  $p$ ,  $q$ , and  $r$  are true and is false otherwise.

3. (HW1 §1.4 #5) Consider the following statement,  
 “Every koala can climb or speak English.”
- (a) [2] Express the statement above using predicates, quantifiers, and logical connectives.
- (b) [2] Negate part (a) so that no negation is to the left of a quantifier.
4. [2] (logic wks #2) Let the domain be integers between  $-4$  and  $3$  inclusive. Determine the truth value of  $\forall x, (x + 3 \geq 0)$ . Justify yourself.

5. Consider the following combinator

(a) [3] (§1.2 #41)

Find the output of the combinatorial circuit.

(b) [1] Can you write the output of the combinatorial circuit using only one logical connective?

