Some Logic

the Propositional kind

Definition: A *proposition* is a declarative sentence, that is either true xor false. That is, the sentence cannot be both true and false.

1. Determine if the following are propositions or not. *If* the sentence is a proposition, determine its truth value. Consider looking at page 2 for Aristotle questions.

   (a) Aristotle tutored Alexander the Great.

   (b) 81 is a perfect square.

   (c) $2 + 4 = 5$.

   (d) The cookie monster is awesome.

   (e) Read the instructions.

   (f) Logic is taught in Discrete 1.

   (g) $x + 2 = 5$.

   (h) The moon is a giant cookie.

   Mathematicians and Scientists generally get tired of writing the propositions we want to talk about. For example, it is awkward to say that the proposition "Aristotle often walked when lecturing on philosophy." is true. Instead we can collapse/denote the proposition "Aristotle often walked when lecturing on philosophy." as p. We can then more easily say, the proposition p is true.

2. Let the letter in front of each of the propositions in (1) be used to denote it. For example, let c be "2+4=5."
   Rewrite your answers in (1) more compactly, e.g. we can rewrite (c) as c is false.

Notation Let p and q be propositions,

- the *negation* of p is denoted as $\overline{p}$ or $\neg p$ (definition on pg 3)
- the *conjunction* of p and q is denoted as $p \wedge q$ (definition on pg 4)
- the *disjunction* of p and q is denoted as $p \vee q$ (definition on pg 4)

3. Continue to use 1. and determine if each proposition below is true or false.

   $\neg a$ $\qquad$ $\neg c$ $\qquad$ $a \vee c$

   $a \vee b$ $\qquad$ $b \wedge a$ $\qquad$ $b \wedge c$