ASHESI

Discrete Structures and Theory (Spring 2023)
Homework 2
Deadline: 03/02/2023

1. (2 POINTS) Determine whether these biconditionals are true or false.
   a) $2 + 2 = 4$ if and only if $1 + 1 = 2$.
   b) $1 + 1 = 2$ if and only if $2 + 3 = 4$.
   c) $1 + 1 = 3$ if and only if monkeys can fly.
   d) $0 > 1$ if and only if $2 > 1$.

2. (3 POINTS) Use logical equivalences to show that $(p \rightarrow r) \vee (q \rightarrow r) \equiv (p \wedge q) \rightarrow r$.

3. (3 POINTS) Let $Y(x)$ be the statement "x is a youtuber" where the domain consists of Ashesi students. Express each of these quantifications in English.
   a) $\exists x Y(x)$
   b) $\forall x Y(x)$
   c) $\neg \exists x Y(x)$
   d) $\exists x \neg Y(x)$
   e) $\neg \forall x Y(x)$
   f) $\forall x \neg Y(x)$