WHITE EXAM

1. (a) She is not hungry.
   (b) She does not eat.
   (c) If she does not eat,
       then she is not hungry.
   (d) If she eats,
       then she is hungry.

2. If P and Q are antipodal points, then there are
   infinitely many great circles on which both lie.

3. (a) no, yes, yes
   (b) \( \{a, b, c, f, p\} \)
   \( \{a, b, c, f, p\} \)
   \( \{a, b, c, f, p\} \)

4. Let A and B be two points for which
   there are distinct lines l and m such
   that A and B both lie on l and m.
   Suppose A \( \not= \) B. By (I1), there is a unique
   line on which both A and B lie, which
   contradicts the hypothesis that there are
   distinct lines l and m on which both,
   A and B lie. Therefore A = B.

5. (a) \( \rho((1,1), (-1,1)) = 2 + 0 = 2 \)
   \( \rho((-1,1), (1,1)) = 2 + 0 = 2 \)
   \( \rho((-1,1), (-1,-1)) = 2 + 3 = 5 \)

YELLlow EXAM

1. (a) He is very sick.
   (b) He does not go to school.
   (c) If he does not go to school,
       then he is very sick.
   (d) If he goes to school,
       then he is not very sick.

3. (a) no, yes, yes
   (b) \( \{a, b, c, f, d\} \)
   \( \{a, c, f, d\} \)
   \( \{a, c, f, d\} \)

4. Let P and Q be two points for which
   there are distinct lines l and m such
   that P and Q both lie on l and m.
   Suppose P \( \not= \) Q. By (I1), there is a unique
   line on which both P and Q lie, which
   contradicts the hypothesis that there are
   distinct lines l and m on which both
   P and Q lie. Therefore P = Q.

5. (a) \( \rho((1,-1), (0,1)) = 2 + 2 = 4 \)
   \( \rho((-1,0), (1,1)) = 1 + 1 = 2 \)
6. Let P, Q, R, and S be four distinct points for which \( P \neq Q \neq R \) and \( Q \neq R \neq S \). By definition of betweenness, 
\[
PQ + QR = PR \quad \text{and} \quad QR + RS = QS.
\]
So, substituting, we find
\[
PQ + QS = (PR - QR) + (QR + RS) = PR + RS.
\]

7. (a) F
(b) F
(c) T
(d) F
(e) T
(f) F

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(b) F
(c) T
(d) F
(e) T
(f) T