MATH 367 - SPRING 2016 - EXAM 1 PARTIAL SOLUTIONS

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.

YELLOW 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 does go to school, then he is not very sick.

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

White exam

3. (a) no, yes, yes
   (b) $\{Q, R, S\}$, P
   $\{Q, S\}$, P
   $\{Q, S\}$, P

Yellow exam

3. (a) no, yes, yes
   (b) $\{A, B, C\}$, D
   $\{A, C\}$, D
   $\{A, C\}$, D

White exam

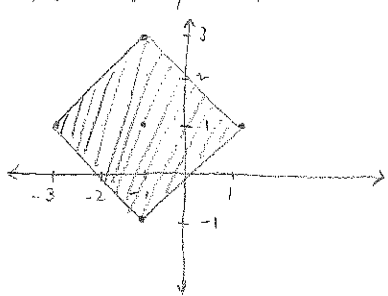
4. Let A and B be two points for which there are distinct lines ℓ and m such that A and B both lie on ℓ and m. Suppose $A \neq B$. By (I1), there is a unique line on which both A and B lie, which contradicts the hypothesis that there are distinct lines ℓ and m on which both A and B lie. Therefore $A = B$.

Yellow exam

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 $P \neq Q$. 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 $A = B$.

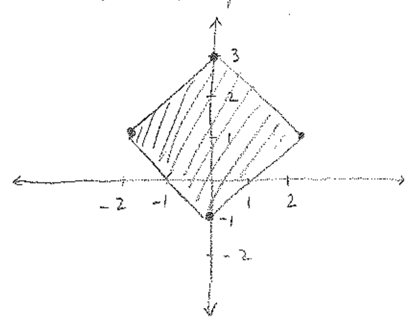
White exam

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



Yellow exam

5. (a) $\rho((-1,-1),(1,1)) = |1-(-1)| + |1-(-1)| = 2+2 = 4$
   $\rho((-1,0),(0,1)) = |0-(-1)| + |1-0| = 1+1 = 2$
   (b)



6. Let P, Q, R, and S be four distinct points for which $P*Q*R$ and $Q*R*S$. By definition of betweenness,

$$PQ + QR = PR \text{ and}$$
$$QR + RS = QS.$$

So, substituting, we find

$$PQ + QS = (PR - QR) + (QR + RS)$$
$$= PR + RS.$$

7. (a) F
   (b) F
   (the points need not be collinear, and if they are, B need not be between A and C)
   (c) T
   (d) F
   (maybe $P*R*Q$)
   (e) T
   (f) F
   (these are rays)

6. Let A, B, C, and D be four distinct points for which $A*B*C$ and $B*C*D$. By definition of betweenness,

$$AB + BC = AC \text{ and}$$
$$BC + CD = BD.$$

So, substituting, we find

$$AB + BD = (AC - BC) + (BC + CD)$$
$$= AC + CD.$$

7. (a) T
   (b) F
   (the points need not be collinear, and if they are, Q need not be between P and R)
   (c) T
   (d) F
   (maybe $A*B*C$)
   (e) F
   (these are rays)
   (f) T