Geometry Test 2 Review: first study quizzes!

Formulas $d_S(A,B) = R\cos^{-1}\left(\frac{A\cdot B}{R^2}\right)$. $\quad d_H(A,B) = \ln\left(\frac{1-A\cdot B+d_E(A,B)}{1-A\cdot B-d_E(A,B)}\right)$.

Given point set $\mathcal{P} = \{A, B, C, D, E\}$;

(1) For $\mathcal{P}$ with lines $\mathcal{L} = \{l, q, s, u\}$,
let $\mathcal{I} = \{(A,l), (B,l), (C,l), (D,l), (A,q), (B,s), (D,u), (E,q), (E,s), (E,u)\}$.

Is this an abstract incidence geometry or not? Draw a diagram and explain.

(2) For $\mathcal{P}$ with lines $\mathcal{L} = \{l, q, s, u, t, w\}$,
let $\mathcal{I} = \{(A,l), (B,l), (C,l), (D,l), (A,q), (B,s), (C,t), (D,u), (E,q), (E,s), (E,t), (E,u), (E,w)\}$.

Is this an abstract incidence geometry or not? Draw a diagram and explain.

(3) For $\mathcal{P}$ with lines $\mathcal{L} = \{l, q, s, u, t, w\}$,
let $\mathcal{I} = \{(A,l), (B,l), (C,l), (D,l), (A,q), (A,w), (B,s), (C,t), (D,u), (E,q), (E,s), (E,t), (E,u), (E,w)\}$.

Is this an abstract incidence geometry or not? Draw a diagram and explain.

(4) For $\mathcal{P} = \{A, B, C, D, E, F\}$ with lines $\mathcal{L} = \{l, q, s, u, t, w, r, v\}$,
let $\mathcal{I} = \{(A, l), (A, q), (A, w), (B, q), (B, s), (B, t), (C, t), (C, l), (C, u), (D, u), (D, s), (D, w), (E, l), (E, s), (F, l), (F, r), (F, v), (D, r), (D, v)\}$.

Is this an abstract incidence geometry or not? Draw a diagram and explain.

(5) For number (4) above, find the line cardinality vector *LCV*. If another incidence geometry has a different LCV, can you find an isomorphism between them?

(6) For number (4) above, find the automorphism f such that $f(A) = C$, $f(B) = B$, and $f(C) = A$.

(7) For number (4) above, find the automorphism f such that $f(A) = A$, $f(B) = D$, and $f(C) = F$.

(8) Consider the three points given: $A = (1/2, 0)$, $B = (1/4, 1/4)$, and $C = (1/2, 1/2)$,
Find the 12 distances: Euclidean, Taxicab, Max, Bus, Post-Office, and Hyperbolic between the two points.

$d_E(A, B) =$ _____ $d_E(B, C) =$ _____

$d_T(A, B) =$ _____, $d_T(B, C) =$ _____

$d_M(A, B) =$ _____, $d_M(B, C) =$ _____

$d_B(A, B) =$ _____, $d_B(B, C) =$ _____

$d_P(A, B) =$ _____, $d_P(B, C) =$ _____

$d_H(A, B) =$ _____, $d_H(B, C) =$ _____

For Euclidean, Taxicab, Max, and Hyperbolic,
what are the equivalence classes of the two segments $\overline{AB}$ and $\overline{BC}$?

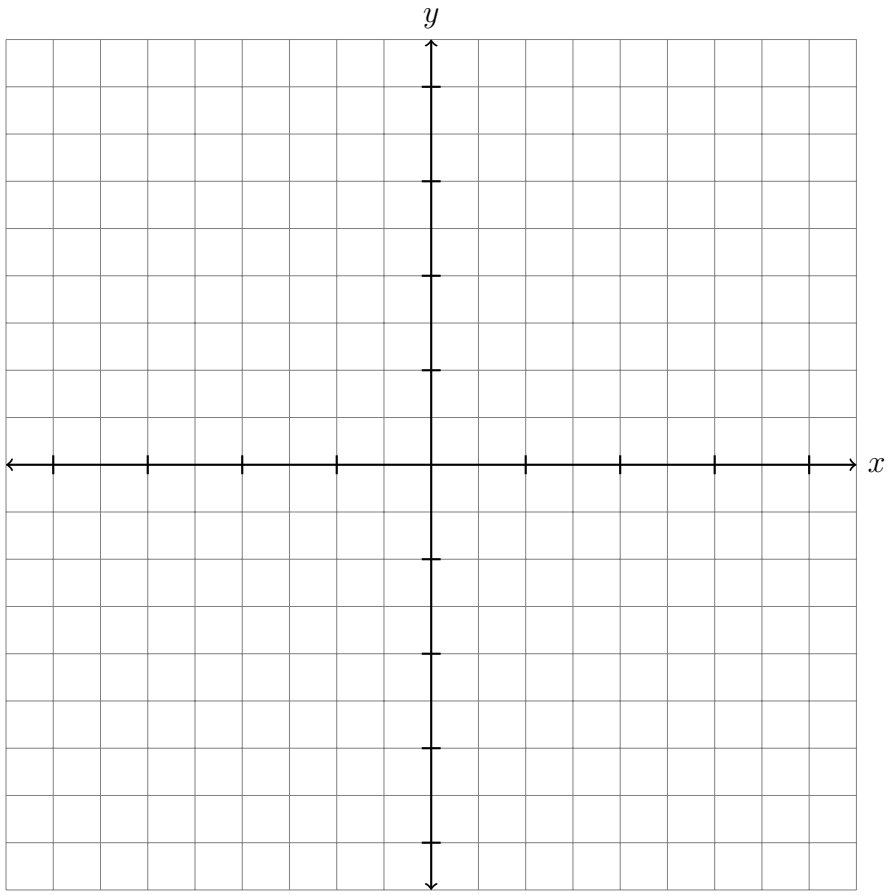
E _____

T _____

M _____

H _____

(9) Draw the circle for each metric centered at B through the point A. Use compass and straightedge.



(10) Find the three distances between points $A = (2, 10, 25)$, $B = (2, 14, 23)$, and $C = (7, 14, 22)$ on the sphere with radius = 27.

$d_S(A, B) =$ _____, $d_S(B, C) =$ _____, $d_S(A, C) =$ _____.