Alternate solution for problem 3

This problem can be solved using the Plane Separation Postulate rather than Pasch's Theorem as follows: By $a * b * c$ and $a * d * e$ we know that a and b are on the same sice of cd while a and e are on opposite sides of cd. Therefore b and e are on opposite sides of cd and hence there is a point $x \in (be) \cap cd$. If we switch the roles of b and c with those of d and e, we see that there is a point $y \in (cd) \cap be$. Now the lines cd and be have only one point in common (they are distinct), and since both x and y lie on the two lines we must have $x = y$. But this means that $x = y$ lies on each of the segments (be) and (cd).$\blacksquare$