5. $(-1)a-(-a)=(-1)a+(-(-a))$ (Defn. of subtraction)

6. $(-1)a+(-(-a))=(-1)a-(-a)$ (Symmetry of eq on 5)

7. $(-1)a+(-(-a))=c$ (Transitivity of eq 6,4)

8. $-(-a)=a$ (Part b) 9. $(-1)a+(-(-a))=(-1)a+a$ (Substitution of eq on 8)

10. $(-1)a+a=(-1)a+(-(-a))$ (Symmetry of eq on 9)

11. $(-1)a+a=c$ (Transitivity of eq on 10,7)

12. $1\cdot a=a$ (M3) 13. $(-1)a+1\cdot a=(-1)a+a$ (Substitution of eq on 12)

14. $(-1)a+1\cdot a=c$ (Transitivity of eq on 13,11)

15. $((-1)+1)\cdot a=(-1)\cdot a+1\cdot a$ (D) 16. $((-1)+1)\cdot a=c$ (Transitivity of eq on 15,14)

17. $(-1)+1=0$ (A4) 18. $((-1)+1)\cdot a=0\cdot a$ (Substitution of eq on 17)

19. $0\cdot a=a\cdot 0$ (M1) 20. $((-1)+1)\cdot a=a\cdot 0$ (Transitivity of eq on 18,19)

21. $a\cdot 0=0$ (Thm 2.1.2(c)) 22. $((-1)+1)\cdot a=0$ (Transitivity of eq on 20,21)

23. $c=((-1)+1)\cdot a$ (Symmetry of eq on 16) 24. $c=0$ (Transitivity of eq on 23,22)

But, $c\in P$. ∴ This is a contradiction

Similarly, we will again arrive at $c=0$ if we assume $(-1)a<-a$. (Contradiction)

$\boxed{\therefore (-1)a=-a}$ (Proved)

25. Let $-a>(-1)a$ 26. $(-a)-(-1)a\in P$ (Defn. 2.1.6(a) on 25)

27. ∵ P is non-empty, $\exists c_1\in P$ s.t. $(-a)-(-1)a=c_1$

28. $(-a)-(-1)a=(-a)+(-(-1)a)$ (Defn. of subtraction)

29. $(-a)+(-(-1)a)=(-a)-(-1)a$ (Symmetry of eq on 28)

30. $(-a)+(-(-1)a)=c_1$ (Transitivity of eq on 29,27)

31. $a+((-a)+(-(-1)a))=a+c_1$ (Substitution of eq on 30)

32. $(a+(-a))+(-(-1)a)=a+((-a)+(-(-1)a))$ (A2)

33. $(a+(-a))+(-(-1)a)=a+c_1$ (Transitivity of eq on 32,31)

34. $a+(-a)=0$ (A4) 35. $(a+(-a))+(-(-1)a)=0+(-(-1)a)$ (Substitution of eq on 34)

36. $0+(-(-1)a)=(-(-1)a)$ (A3) 37. $(a+(-a))+(-(-1)a)=(-(-1)a)$ (Transitivity of eq on 35,36)