Phil 225 – Symbolic Logic

HW 9 Possible Answers

April 18, 2011

15.15:

 1) {2,4}

 2) {2,4}

 3) {2,3,4,5,6,8}

 4) ∅

 5) {2,3,4,5,6,7,8,9]

 6) {2,3,4,5,7,9}

 7) {2,3,4,5}

15.17 See attached Fitch proof

15.23:

 a has 2 elements; b has 1 element. So a ≠ b

15.40-1

 a) Spose R is symmetric, and spose <x,y> ∈ R. By symmetry, <y,x> ∈

 R, so by def of R-1, <x,y> ∈ R-1. b) Conversely, spose <x,y> ∈ R-1. Then by def of inverse, <y,x> ∈ R. So since R is symmetric, <x,y> ∈ R. Hence <x,y> ∈ R iff <x,y> ∈ R-1, so by extensionality, R = R-1.

15.40 – 2:

 a) Spose <x,y> ∈ (R-1)-1. Then by def of inverse, <y,x> ∈ R-1, so by def of inverse again, <x,y> ∈ R. b) Conversely, by the same reasoning, if <x,y> ∈ R, then <x,y> ∈ (R-1)-1. Hence <x.y> ∈ R iff <x,y> ∈ (R-1)-1, so by extensionality, R = (R-1)-1.

 We could also do these more simply as chains of bi-conditionals. Thus: <x,y> ∈ R iff <y,x> ∈ R-1 (by def of inverse) iff <x,y> ∈ (R-1)-1 (again by def of inverse). Where the argument forward and backward is the same, this is a much simpler way of establishing a bi-conditional. But often the arguments are different, so it must be spelled out. The first one would also be simpler by this method.

15.54

 {∅, {2}, {3}, {4}, {2,3}, {2,4}, {3,4}, {2,3,4}}

15.56

 {∅, {2}}

15.58

 {∅, {∅}, {{2}}, {{3}}, {{2,3}}, {∅,{2}}, {∅,{3}}, {∅,{2,3}}, {{2},{3}}, {{2},{2,3}},{{3},{2,3}}, {{2},{3},{2,3}}, {∅,{3},{2,3}}, {∅,{2},{2,3}}, {∅,{2},{3}}, {∅,{2},{3},{2,3}}}