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}}}