Homework 3(2)

5.   A = {1,2,3,5,6,10,15,30}
  (a) R={<1,1>,<1,2>,<1,3>,<1,5>,<1,6>,<1,10>,<1,15>,<1,30>,<2,2>,<2,6>,<2,10>,<2,30>,
       <3,3>,<3,6>,<3,15>,<3,30>,<5,5>,<5,10>,<5,15>,<5,30>,<6,6>,<6,30>,<10,10>,<10,30>,
       <15,15>, <15,30>,<30,30>}
       R is reflexive, antisymmetric, transitive, and nonconnected. It is therefore a weak partial
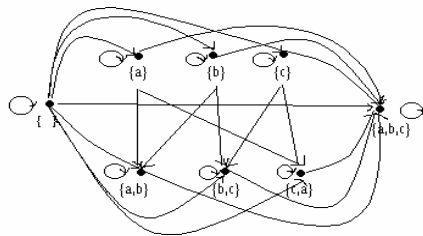   order.
  (b) 1 is minimal (it isn't preceded by any other element) and least (it precedes every element); 30
       is maximal (it isn't succeeded by any other element) and greatest (it succeeds every
       element):
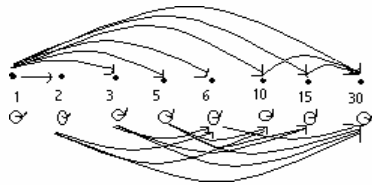
  (c) $\wp$(B) = {∅,{a},{b},{c},{a,b},{b,c},{c,a},{a,b,c}}
       R={<∅,∅>,<∅,{a}>,<∅,{b}>,<∅,{c}>,<∅,{a,b}>,<∅,{b,c}>,<∅,{c,a}>,<∅,{a,b,c}>,
       <{a},{a}>,<{a},{a,b}>,<{a},{c,a}>,<{a},{a,b,c}>,<{b},{b}>,<{b},{a,b}>,<{b},{b,c}>,
       <{b},{a,b,c}>,<{c},{c}>,<{c},{b,c}>,<{c},{a,c}>,<{c},{a,b,c}>,<{a,b},{a,b}>,
       <{a,b},{a,b,c}>,<{b,c},{b,c}>,<{b,c},{a,b,c}>,<{c,a},{c,a}>,<{c,a},{a,b,c}>,
       <{a,b,c},{a,b,c}>}
       R is reflexive, antisymmetric, transitive, and nonconnected. It is therefore a weak partial
       order.

       ∅ is minimal (it isn't preceded by any other element) and least (it precedes every element);
       {a,b,c} is maximal (it isn't succeeded by any other element) and greatest (it succeeds every
       element).

6. *Linguistics grad students* = {Adam, Andries, Hosuk, Melissa, Minjoo}
Year,Class = {1^{st} year, 2nd year, 3rd year, 4th year}

(a) *f: Linguistics grad students* → *Year,Class*
ker $f = f^{-1} \circ f$ = {<Adam,Adam>,<Andries,Andries>,<Andries,Minjoo>,
<Hosuk,Hosuk>,<Hosuk,Melissa>,<Melissa,Melissa>,<Minjoo,Minjoo>}

(b) Quotient set
 Linguistics grad students/**ker** f = {{Adam},{Andries,Minjoo},{Hosuk,Melissa}}

(c) Commutative diagram

f

{Adam, Andries, Hosuk, Melissa, Minjoo} ┈┈┈┈┈┈┈┈┈➤ {1^{st} , 2nd, 3rd, 4th}

nat(**ker** *f*)

{{Adam},{Andries,Minjoo},{Hosuk,Melissa}}