Class test 2 Solution

1. R is not a partial order because R is not anti-symmetric. M[3, 2] and M[2, 3] are both 1.

2. (a) For the first part R = {any non-empty subset of {(a,a), (b,b), (c,c), (d,d), (e,e)} will suffice.

   (b) For a relation to be symmetric, when a is not equal to b, if (a,b) belongs to R, then we MUST have (b,a) belongs to R.So, in creating a symmetric relation R, of the 20 ordered pairs of the form (a,b) with a not equal to b, we can REALLY only choose whether C(5,2) = 10 of them are in the relation or not. This can be done in 2^{10} ways. Furthermore, we have a choice as to whether any of the ordered pairs of the form (a,a) are in the relation. There are 5 such ordered pairs. So, we have 2^5choices here. Multiplying these, we find that there are a total of 2^{10}x$2^5 = 2^{15}$ = 32768 total symmetric relations.

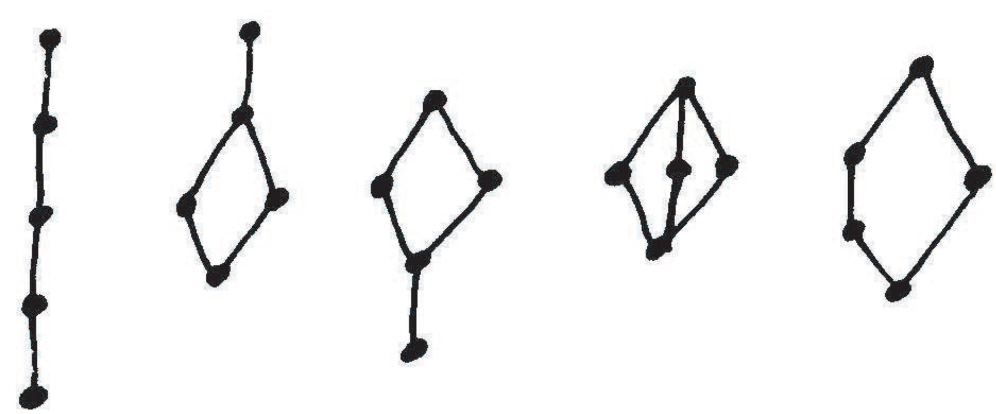
3. (a) Note that foo multiplies n by itself m times, so we get:
   $foo(n, m) = n^m$

   (b) The inner loop of bar runs n + 1 times, and each time it adds another call to foo(n, 3), which we know is n^3. Thus we have the following:

$$\sum_{i=0}^{n} n^3 = (n+1)n^3$$

4. (a) No and No. Two elements map to *c.* No element maps to element *a* in B.
   (b) No. LUB(b, c) does not exist.

5.



6. Let $a, b \in G$. Then $1 = (ab)^2 = (ab)(ab)$ shows that $e = abab$. Multiplying both sides of this equation on the left by a and on the right by b gives $ab = a.1.b = a(abab)b = a^2bab^2 = 1.ba.1 = ba$. Therefore $ab = ba$ which shows that G is abelian.