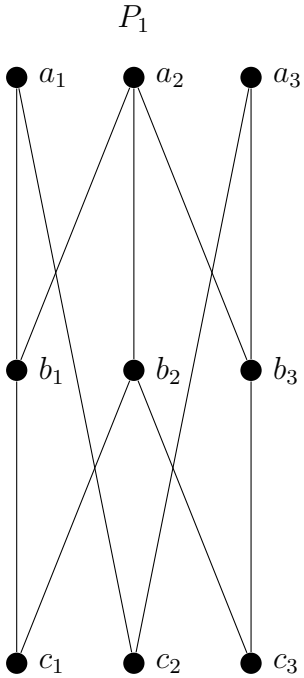
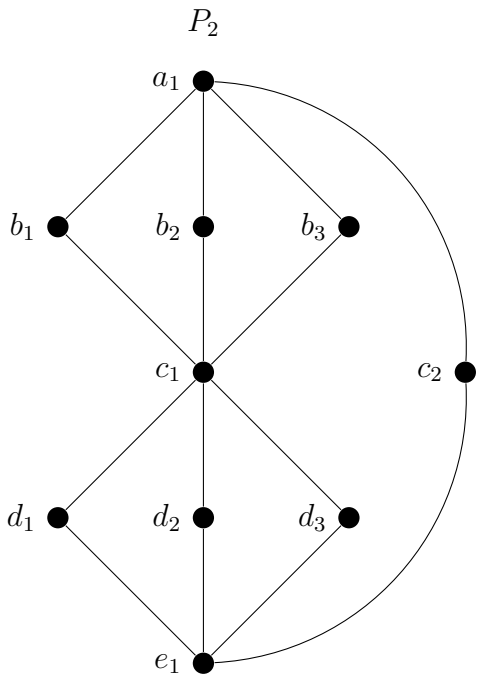
MATH 2030 – Combinatorics 1

Worksheet 9

1. For the (strict) partial orders P_1 and P_2 do the following:
   (a) i. Find a longest chain.
   ii. Find the appropriate number of disjoint antichains which contain all the elements.
   (b) i. Find a largest antichain.
   ii. Find the appropriate number of disjoint chains which contain all the elements.
   (c) Find bounds on the dimension. If possible, find the dimension.
   (d) Is it a lattice? (justify)





2. Consider the following lattice on the divisors of 210.
   (a) i. Find a longest chain.
   ii. Find the appropriate number of disjoint antichains which contain all the elements.
   (b) i. Find a largest antichain.
   ii. Find the appropriate number of disjoint chains which contain all the elements.
   (c) Find bounds on the dimension. If possible, find the dimension.
   (d) Show that this is a lattice, and describe $a \vee b$ and $a \wedge b$.
   (e) Show that the lattice is complemented.
   (f) Is this a boolean lattice?

P_3