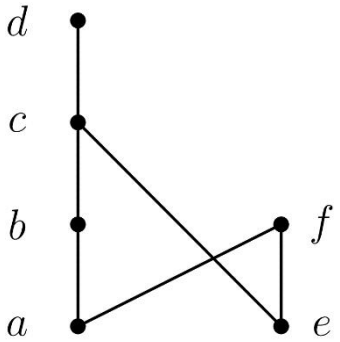
Concept Checking Paper 03

1. What is “math” based on all the math you have learned in your life?

2. For the Hasse/Order Diagram on the right side,list all the element that is covered by **c**.



3. For the same graph, list the maximal/minimal element, as well as the maximum/minimum element. What’s the difference between them? Does one of them is always an example of another one?

4. Write the set of ordered pairs representing the poset above. And draw the comparability graph.

5. Find a maximal chain. Find a maximum chain.

6. Is the above (5.) ordered set a lattice? Is it complete?

7. State the Pigeonhole Principle for finite set and recall its proof.

8. Let A be any finite set. Prove that for any function $f: A \to \mathrm{A}$, if f is injective then f is bijective.

9. Why $\{\mathrm{X} \mid card\ X = \kappa, \kappa \neq 0\}$ is not a set?

10. Prove the following equinumerosity, please pay attention to the way that you build the bijection.

a. $\mathbb{N} \approx \mathbb{N}^2$

b. $\mathbb{Z} \approx \mathbb{N}$

c. $(0,1) \approx \Re$

d. $[0,1] \approx (0,1)$

e. $2^{\mathbb{N}} \approx \Re$