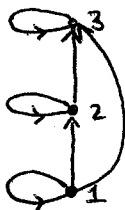Name: _____ (key) _____

1. Draw an arrow diagram for the "is an element of" relation $\in$ from $X = \{0,1,2,3\}$ to $Y = \mathcal{P}(\{0,2\})$.
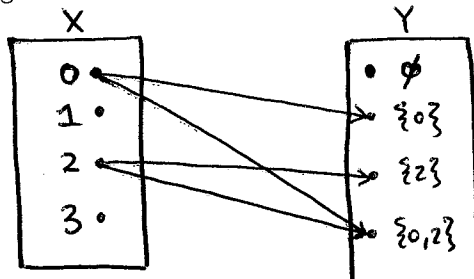
2. Define the relation R on $X = \{1,2,3\}$ by

$$x R y \text{ if and only if } x \leq y.$$

(a) Draw a digraph (directed graph) for the relation R on X.

(b) Show that R is a partial order relation on X.

proof:

__reflexive__: $\forall x \in X$, $x \leq x$ hence $x R x$ ✓

__antisymmetric__: Let $x, y \in X$ and let $x R y \wedge y R x$
so $x \leq y$ and $y \leq x$
this is only true if $x = y$ (property of R and $X \subseteq \mathbb{R}$) ✓

__transitive__: Let $x, y, z \in X$ and let $x R y \wedge y R z$
so $x \leq y$ and $y \leq z$
so $x \leq y \leq z$ so $x \leq z$ hence $x R z$ ✓ □

(c) Draw a Hasse diagram for the relation R on X.