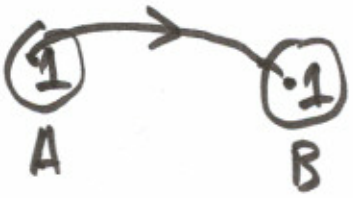
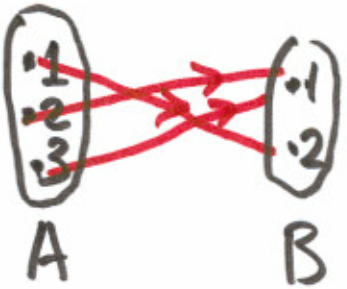
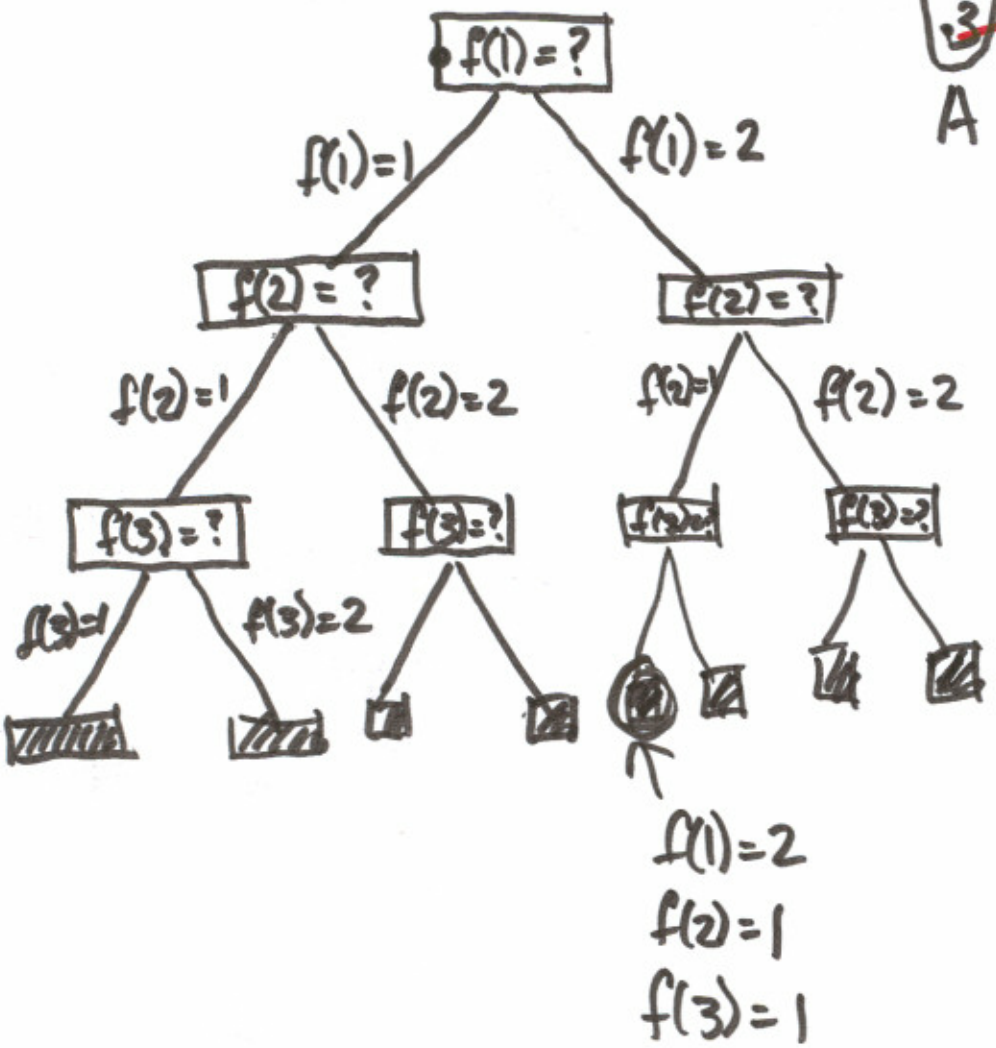
$A = \{1\}$ $B = \{1\}$



$A = \{1,2,3\}$ $B = \{1,2\}$

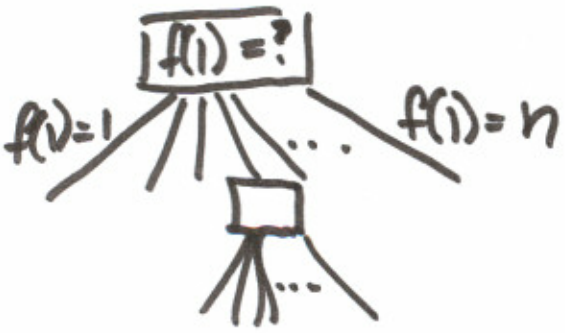


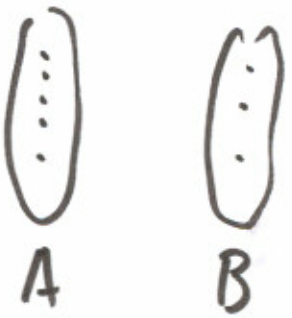


$f(1)=2$
$f(2)=1$
$f(3)=1$

$|\{f: A \to B\}| = 8$

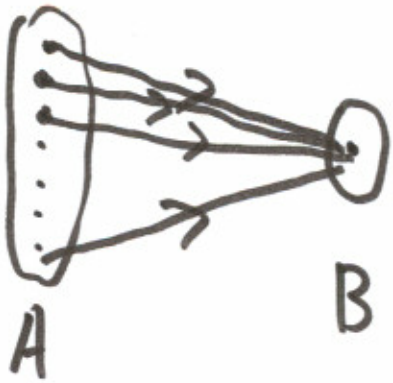
$A = \{1,2,\dots,m\}$ $B = \{1,2,\dots,n\}$



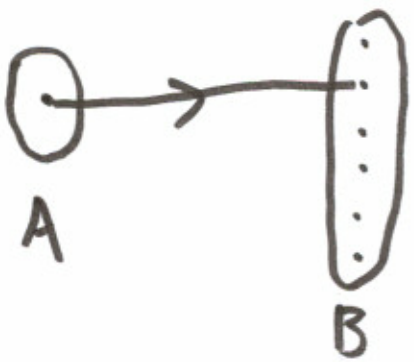


$\underbrace{n \cdot n \cdot n \cdots n}_{m \text{ times}} = \boxed{n^m}$

$n=1$, m is large.

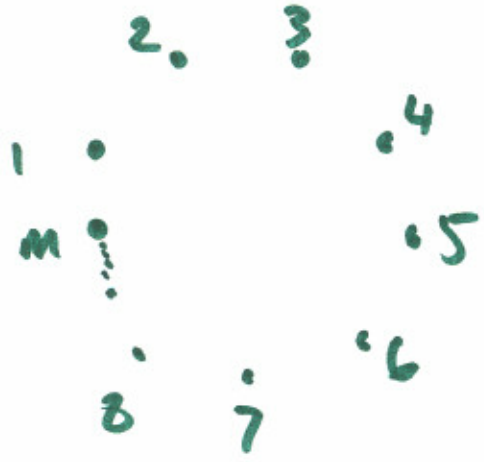


$m=1$, n is large



n functions

How many graphs on n vertices?



Let's add up

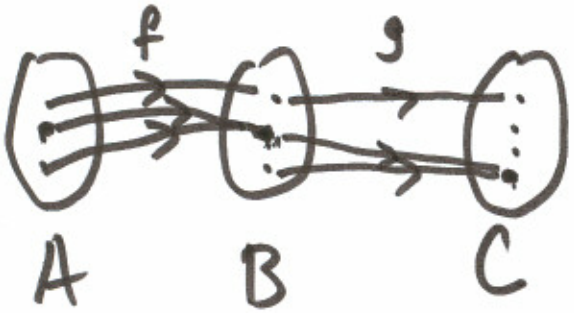
graphs /w 0 edges - 1
+ # graphs /w 1 edge - $\binom{\alpha}{1}$
+ # graphs /w 2 edges - $\binom{\alpha}{2}$
+ ⋮
+ # graphs /w $\binom{n}{2}$ edges

Let $S = \{\{u,v\} \mid 1 \le u, v \le n\}$.

$|S| = \binom{n}{2} \equiv \alpha$

HW2: $\sum_{k=0}^{\alpha} \binom{\alpha}{k} = 2^{\alpha} = 2^{\binom{n}{2}}$

36):

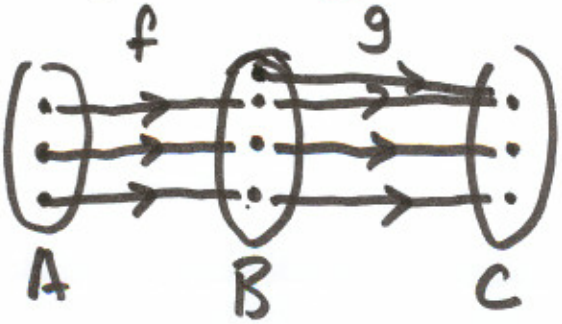


$h: A \to C$

$h(a) = g(f(a))$

If h is injective, f and g are injective.

Ans: False.



$n=2$, $\mathcal{U} = \{1,2,3\}$.

$$\mathcal{A} = \{\{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$$

$$A_0 = \{\{1\}\}, \quad A_1 = \{\{2\}, \{1,2\}\}$$

$$A_2 = \{\{3\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$$

$$\mathcal{A} = A_0 \cup A_1 \cup \cdots \cup A_n$$

$$|\mathcal{A}| = |A_0| + |A_1| + \cdots + |A_n|$$

$$2^{n+1} - 1 = \sum_{j=0}^{n} |A_j|$$

$$= \sum_{j=0}^{n} 2^j$$

What if there's only one or two pirate?

- P_1 gets all gold coins.

	weakest pirate →						Strongest pirate
n=1	✓ 1000						
n=2	✗ 0	✓ 1000					
n=3	✓ 1	✗ 0	✓ 999				
n=4	✗ 0	✓ 1	✗ 0	✓ 999			
n=5	✓ 1	✗ 0	✓ 1	✗ 0	✓ 998		
n=6	✗ 0	✓ 1	✗ 0	✓ 1	✗ 0	✓ 998	