CSC 2259 2/13/20

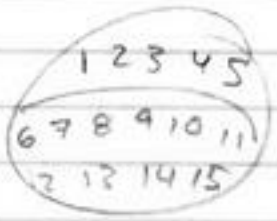
$|H^c| = 5$

$|H| = 10$

(subsets of H) $= 2^{10}$

(subsets not contained in H) $=$ $(2^5 - 1)(2^{10})$

(subsets disjoint from H) $= 2^5$



at least one from H^c

$\{1, 2, 3, \ldots, n\}$

$H \subseteq W$ # (H, W pairs such that $H \subseteq W$) $= 3^n$

$n = 1$

H	W	$\lvert H \rvert = m$	W can have any of remaining $n-m$ items
$\emptyset$	$\emptyset, \{1\}$		
$\{1\}$	$\{1\}$	# (H w/ size m)	# $(W \supseteq H) = 2^{n-m}$

(H, W) $= 3$ $= \binom{n}{m}$

$$\sum_{m=0}^{n} \binom{n}{m} \cdot 2^{n-m} = (2+1)^n = 3^n$$

$\binom{n}{m}$: H of size m; 2^{n-m}: W can have any of $n-m$ remaining items

$\{1, 2, \ldots, n\}$ $H = \{1, 4\} = [1, 0, 0, 1]$

$n = 4$ $W = \{1, 3, 4\} = [1, 0, 1, 1]$

$H \subseteq W$? yes

```
for (int i=0; i<n; i++)
    if (1 == H[i])
        if (0 == W[i])
            return false;
    return (true);
```

if (1 == H[i]) if (1 == W[i]), else return false,

if (H[i] == W[i]) X if (1 == H[i] && 0 == W[i]) ✓

if (H[i] != W[i]) X

→ if (H[i] > W[i]) ✓ return(false);

```
for (int i = 0; i < n; i++)
    if (H[i] > W[i])
        return false;
return(true); // H[i] ≤ W[i] for all i
```

if (H[i] <= W[i]),
else, return (false),

~~[illegible] are equally efficient~~

worse #(iter.) = n and may return true
and may return false $H = [1, 0, 0, 1]$
$W = [1, 0, 1, 1]$

(iter.) < n returns false

#((H, W) pair causing 1 iter. and returning false) $= 2^{n-1} \times 2^{n-1} \times 3$

1: H[0] > W[0] = 0

#(H) = 2^{n-1} #(W) = 2^{n-1}

(H, W)-pairs causing 2-iter and returning false $2^{n-2} \times 2^{n-2}$

H[0] ≯ W[0] H[0], W[0]: 0, 1

1: H[1] > W[1] = 0 H[1]: 1 W[1]: 1