# 1. Select all the statements in the following list ¶

(1) Be sure to wash your dishes after eating
(2) Will there be tacos for dinner?
(3) There are life forms on Jupiter.
(4) 2 + 4 = 82

(1) No, it is a command, not a proposition
(2) No, it is a question
(3) Yes. It is a proposition.
(4) Yes. It is a proposition.

# 2. How many rows will be in a truth table of a wff that contains 6 variables?

A. 12
B. 64
C. 32
D. 6

In [2]:
```
2**6
```

Out[2]: 64

# 3. Please Negate the following:

(1) A ∨ B
(2) If the food is good, then the service is excellent.
(3) A → B

(1) (A ∨ B)' = A' ∧ B'

(2)

1. Translate the english statements into symbolic notation in formal logic:
   F: The food is good.
   S: The service is excellent.
   F → S

2. Applied the implication rule: F → S ↔ F' ∨ S

3. Negate: (F' ∨ S)' = F ∧ S'

4. Translate the negation result back into English:
   The food is good and the service is not excellent.

(3) $A \rightarrow B \leftrightarrow A' \vee B$

$(A' \vee B)' = A \wedge B'$

# 4. Construct the truth tables for the following wffs.

(1) $(A \vee B)'$
(2) $A' \wedge B'$
(3) $(A \rightarrow B) \leftrightarrow (A' \vee B)'$
(4) $A \vee B \leftrightarrow (A' \rightarrow B)$

(1)

| A | B | A ∨ B | (A ∨ B)' |
|---|---|---|---|
| T | T | T | F |
| T | F | T | F |
| F | T | T | F |
| F | F | F | T |

(2)

| A | B | A' | B' | A' ∧ B' |
|---|---|---|---|---|
| T | T | F | F | F |
| T | F | F | T | F |
| F | T | T | F | F |
| F | F | T | T | T |

(3)

| A | B | A' | A → B | A' ∨ B | (A' ∨ B)' | A → B ↔ (A' ∨ B)' |
|---|---|---|---|---|---|---|
| T | T | F | T | T | F | F |
| T | F | F | F | F | T | F |
| F | T | T | T | T | F | F |
| F | F | T | T | T | F | F |

(4)

| A | B | A' | A ∨ B | A' → B | A ∨ B ↔ A' → B |
|---|---|---|---|---|---|
| T | T | F | T | T | T |
| T | F | F | T | T | T |
| F | T | T | T | T | T |
| F | F | T | F | F | T |

## 5. List all wff in #4 that are tautologies or contradictions.

(3) is contradition, (4) is tautology

## 6. List all paris of wffs in #4 that are equivalent

(1) and (2) are equivalent

## 7. Simplify the Boolean expression in the following piece of code

```
if( !( !(x == 2) || (y < z)) || ( (y<z) && (x == 2) ))
{
z++;
}
```

A: x == 2
B: y < z

(A' ∨ B)' ∨ (B ∧ A)
A ∧ B' ∨ (B ∧ A)
(A ∧ B') ∨ (A ∧ B)
A ∧ (B' ∨ B )
A ∧ 1
A

After the simplification, we got:

```
if(x==2) { z++;

}
```