Solution 05: Python Booleans and Logic

1) What is a Boolean?

- A Boolean value is either `True` or `False`.
- `True` and `False` must start with a **capital** letter.

2) Create Boolean variables

```
is_raining = False
is_hungry = True
```

3) What does this print?

Output:

```
True
<class 'bool'>
```

4) True or False (comparisons)

Output:

```
True
False
True
True
```

5) Pick the correct operator

One set of correct answers is:

1. `5 > 2`
2. `7 == 7` (also works: `7 >= 7` or `7 <= 7`)
3. `3 < 9`
4. `10 != 8` (also works: `10 > 8` or `10 >= 8`)
5. `4 == 4` (also works: `4 >= 4` or `4 <= 4`)

6) `=` vs `==` (spot the mistake)

Corrected code:

```
x = 3

if x == 3:
    print("x is three")
else:
    print("x is not three")
```

7) AND: both must be True

Output:

```
Not ready yet.
```

Reason: `True and False` becomes `False`, so the `else` runs.

8) OR: at least one is True

Output:

```
You can play!
```

Reason: `False or True` becomes `True`, so the `if` runs.

9) Fill in the blank (use `and` or `or`)

A correct solution:

```
score = 88
helped_friend = True

if score >= 90 or helped_friend:
    print("You get a badge!")
else:
    print("No badge today.")
```

Output:

```
You get a badge!
```

10) NOT: opposite

Output:

```
Go outside!
```

Reason: `raining` is `False`, so `not raining` is `True`.

11) Predict the result (one line)

1. `True and True` → `True`
2. `True and False` → `False`
3. `False or True` → `True`
4. `False or False` → `False`
5. `not True` → `False`
6. `not False` → `True`

12) Parentheses practice

Let's evaluate:

- `(a < b)` is `(5 < 10)` → `True`
- `(c == 0)` is `(0 == 0)` → `True`
- `not (c == 0)` → `not True` → `False`
- `True and False` → `False`

Output:

```
False
```

13) Another logic puzzle

- `(age >= 13)` is `(13 >= 13)` → `True`
- `has_ticket` is `False`
- `True and False` → `False`

Output:

```
Kids movie
```

14) Truth table (fill in)

p	q	p and q	p or q
True	True	True	True
True	False	False	True
False	True	False	True
False	False	False	False

15) Write a "permission check"

```
age = 9
with_parent = True

if with_parent or age >= 10:
    print("Allowed")
else:
    print("Not allowed")
```

Output:

```
Allowed
```

16) Challenge: Make a simple weather helper

```
is_raining = True

if is_raining:
    print("Bring an umbrella!")
else:
    print("No umbrella needed.")
```

Output:

```
Bring an umbrella!
```