Logic Assignment

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1 Logic Assignment

The following problems are based on Chapter 1 of the 3rd edition of the Finite Math text found at
https://math.dartmouth.edu/~doyle/docs/finite/fm3/scan/1.pdf

1.1 Problem 1

Do Exercise 1 a on page 10 using nested for loops.

    A) q AND ~q

    B) (p OR q) AND ~q

    C) ~p AND q

    D) [~(p AND q) OR (~p AND ~q)]

```
[4]: print("q      " "not q      " "q or not q")
     TF = [True, False]
     for q in TF:
         print(q, not q, q or not q)
```

```
q      not q      q or not q
True False True
False True True
```

```
[95]: print("p      " "q      " "p and q or not q")
      for p in TF:
          for q in TF:
              print(p, q, p and q or not q)
```

```
p      q      p and q or not q
True True True
True False True
False True False
False False True
```

```
[96]: print("p      " "q      " "not p or q\n")
      for p in TF:
```

```
        for q in TF:
            print(p, q, not p or q)
```

```
p     q      not p or q

True True True
True False False
False True True
False False True
```

```
[97]: print("[not (p or q) and ((not p) or (not q)]\n")
      for p in TF:
          for q in TF:
              print(p, q, [not(p or q) and ((not p) or (not q))])
```

```
[not (p or q) and ((not p) or (not q)]

True True [False]
True False [False]
False True [False]
False False [True]
```

1.2 Problem 2

Do Exercise 9 a on page 10 using nested for loops.

A) (~p or q) and (p or ~q)

B) ~(p nor q)

C) ~(p xor ~q)

D) (p or q) and (q or p)

```
[116]: print("p      " "q      " "(not p or q) and (p or not q)")
       for p in TF:
           for q in TF:
               print(p, q, (not p or q) and (p or not q))
```

```
p     q      (not p or q) and (p or not q)
True True True
True False False
False True False
False False True
```

```
[118]: print("p      " "q      " "not (p nor q)")
       for p in TF:
           for q in TF:
```

```
        print(p, q, not (p !=(not q)))
```

```
p     q     not (p nor q)
True True False
True False True
False True True
False False False
```

[121]:
```
print("p     " "q     " "not (p xor (not q)")
for p in TF:
    for q in TF:
        print(p, q, not(p == (not q)))
```

```
p     q     not (p xor (not q)
True True True
True False False
False True False
False False True
```

[122]:
```
print("p     " "q     " "(p or q) and (q or p)")
for p in TF:
    for q in TF:
        print(p, q, (p or q) and (q or p))
```

```
p     q     (p or q) and (q or p)
True True True
True False True
False True True
False False False
```

1.3 Problem 3

Do Exercise 2b on page 14 using nested for loops.

2B) (p and q) -> (p or q)

[6]:
```
print("p     " "q     " "(p and q) => (p or q) ")
for p in TF:
    for q in TF:
        print(p, q, (p and q) == (p or q))
#       print(not(p))
```

```
p     q     (p and q) => (p or q)
True True True
True False False
False True False
False False True
```

[0]: