

## MAT2440 Module 2 – Boolean variables and logical operators.

**Objectives:** Understand how Boolean values and logical operators work in python.

1. Create a new trinket titled “2440 Module 2” to begin today’s activities. Type all of today’s work into this trinket.

2. Basics:

(a) A Boolean variable is either true or false. In Python, these are written in the following way:

```
p = True
q = False
```

(b) Boolean values appear when doing comparisons. Try the following:

```
print 3 == 2
print 3 > 2
```

(c) Boolean values also determine the behavior of if/else statements and while loops.

```
i = 0
while i < 10:
    print i
    i += 1

if True:
    print 'Hi!'
else:
    print 'Bye!'
```

3. Operators:

(a) The negation operator:

```
not p
```

(b) The AND operator:

p and q

(c) The OR operator:

p or q

4. Write code to do the following:

(a) With  $p$  true and  $q$  false, compute the truth value of the following:

i.  $p \vee q$

ii.  $p \rightarrow q$  (Hint: There is no conditional operator, so use an equivalent form)

iii.  $(p \rightarrow q) \wedge \neg q$

iv.  $p \rightarrow (q \wedge \neg q)$

(b) Use the following trinket

<https://trinket.io/python/177455c243>

that constructs truth tables for the following problems:

i. Construct a truth table for  $\neg p \vee q$ .

ii. Construct a truth table for  $(p \vee q) \vee r$ .

iii. Construct a truth table that shows that  $\neg(p \vee q) \equiv \neg p \wedge \neg q$ .