Lab5_DylanLiesenfelt

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1 Consider the following logic argument:

1.1 (a) $ p q →r $

1.2 (b) $ s q $

1.3 (c) $ t $

1.4 (d) $ p →t $

1.5 (e) $ p r → s $

1.6 (f) $ q $

2 1. Create a truth table and find the critical row

3 2. Identify the values for p,q,r,s and t for the argument to be valid

4 3. Use valid argument forms to deduce the conclusion from the premises and test each one

[ ]:
```
def implies(p, q):
    return not p or q

print(f"{'p'} \t{'q'} \t{'r'} \t{'s'} \t{'t'} \t\t{'a'} \t{'b'} \t{'c'} \t{'d'}␣
 ↪\t{'e'} \t{'f'}")
for p in [True, False]:
    for q in [True, False]:
        for r in [True, False]:
            for s in [True, False]:
                for t in [True, False]:
                    a = implies(not p or q, not r)
                    b = s or not q
                    c = not t
                    d = implies(p,t)
                    e = implies(not p and r, not s)
```

```
                    f = not q
                    if all([a,b,c,d,e]):
                        critical_row = "<-critical row"
                        #print(f'{p} \t{q} \t{r} \t{s} \t{t} \t\t{a} \t{b}␣
↪\t{c} \t{d} \t{e} \t{f} {critical_row}')
                    else:
                        critical_row = ""
                        flag = " "
                    print(f'{p} \t{q} \t{r} \t{s} \t{t} \t\t{a} \t{b} \t{c}␣
↪\t{d} \t{e} \t{f} {critical_row}')
```

```
p       q       r       s       t               a       b       c       d
e       f
True    True    True    True    True            False   True    False   True
True    False
True    True    True    True    False           False   True    True    False
True    False
True    True    True    False   True            False   False   False   True
True    False
True    True    True    False   False           False   False   True    False
True    False
True    True    False   True    True            True    True    False   True
True    False
True    True    False   True    False           True    True    True    False
True    False
True    True    False   False   True            True    False   False   True
True    False
True    True    False   False   False           True    False   True    False
True    False
True    False   True    True    True            True    True    False   True
True    True
True    False   True    True    False           True    True    True    False
True    True
True    False   True    False   True            True    True    False   True
True    True
True    False   True    False   False           True    True    True    False
True    True
True    False   False   True    True            True    True    False   True
True    True
True    False   False   True    False           True    True    True    False
True    True
True    False   False   False   True            True    True    False   True
True    True
True    False   False   False   False           True    True    True    False
True    True
False   True    True    True    True            False   True    False   True
False   False
False   True    True    True    False           False   True    True    True
```

```
False   False
False   True    True    False   True            False   False   False   True
True    False
False   True    True    False   False           False   False   True    True
True    False
False   True    False   True    True            True    True    False   True
True    False
False   True    False   True    False           True    True    True    True
True    False <-critical row
False   True    False   False   True            True    False   False   True
True    False
False   True    False   False   False           True    False   True    True
True    False
False   False   True    True    True            False   True    False   True
False   True
False   False   True    True    False           False   True    True    True
False   True
False   False   True    False   True            False   True    False   True
True    True
False   False   True    False   False           False   True    True    True
True    True
False   False   False   True    True            True    True    False   True
True    True
False   False   False   True    False           True    True    True    True
True    True <-critical row
False   False   False   False   True            True    True    False   True
True    True
False   False   False   False   False           True    True    True    True
True    True <-critical row
```

[ ]:
```
p = False # Meaning that the premise (not p) is True
q = False # This is the conclusion, (not q) is True
r = True  # Meaning that the premise (not r) is True
s = False # Meaning that the premise (not s) is True
t = False # Meaning that the premise (not t) is True
```

[ ]:
```
print("By Modus Tollens")
print(implies(p,t))
print(not t)
print(not p)
```

```
By Modus Tollens
True
True
True
```

[ ]:
```
print("By Generalization")
print(not p)
```

```
print(not p or q)
```

```
By Generalization
True
True
```

[ ]:
```
print("By Modus Ponens")
print(implies(not p or q,r))
print(not p or q)
print(r)
```

```
By Modus Ponens
True
True
True
```

[ ]:
```
print("By Conjuction")
print(r)
print(not p)
print(not p and r)
```

```
By Conjuction
True
True
True
```

[ ]:
```
print("By Modus Ponens")
print(implies(not p and r, not s))
print(not p and r)
print(not s)
```

```
By Modus Ponens
True
True
True
```

[ ]:
```
print("By Elimination")
print(s or not q)
print(not s)
print(not q)
```

```
By Elimination
True
True
True
```