1. [10 points] Write the truth table for the proposition ¬(r →¬q)∨(p∧¬r).
2. [10 points] (a)Find a proposition with the truth table at the right. (if not p and q,then true; otherwise. false)(b) Find a proposition using only p,q,¬, and the connective ∨ that has this truth table.
3. [10 points] Suppose the variable x represents students and y represents courses, and:

U(y): y is an upper-level course

M(y): y is a math course

F(x): x is a freshman

A(x): x is a part-time student

T(x,y): student x is taking course y.

Write the statement using these predicates and any needed quantiﬁers.

(1). Every student is taking at least one course.

(2) There is a part-time student who is not taking any math course.

(3) Every part-time freshman is taking some upper-level course.

1. [20 points] Find the principal disjunctive normal form of (a) and (b).
2. **(¬p∧¬q)→(p∧¬r)**
3. **((p∨¬q)∧r)∧((¬p∧¬q)∨r)**

1. [20 points] Put the statement (a) and (b) in prenex normal form.
2. ¬∀x(F(x)→∃x ¬M(x)).
3. ∀x B(x)∧∃xF(x) → (∀y M(y)∧∃x∀y T(x,y)).

1. [15 points] Show that the premises “Jean is a student in my class” and “No student in my class is from England” imply the conclusion “Jean is not from England”.
2. [15 points] Prove that if n2 −1 is odd then n is even.