

Exam 1 A

Name:.....

Make sure to neatly and clearly show all work and mark your answers.

I have neither given nor received aid on this exam.

Signature:.....

**1** (4 pts). 1. Write the following set using set-builder notation  $\{1, 3, 5, 7, \dots\}$ .

2. List the elements of the following set  $\{x : x^2 - 4 = 0\}$ .

**2** (6 pts). Let  $A = \{a, c, e\}$  and  $B = \{c, e, g\}$  and  $U = \{a, b, c, d, e, f, g\}$ . Then draw a venn-diagram for  $A, B$  and  $U$  putting each of the elements of  $U$  in the appropriate region of the venn-diagram.

**3** (15 pts). Let  $A = \{0, 1, 2\}$  and  $B = \{0, 2\}$ . Then find

1.  $A \cup B$

2.  $(A \cap B) \times B$

3.  $\mathcal{P}(A)$

4.  $\mathcal{P}(A - B) \times \mathcal{P}(B - A)$ .

5. What is  $|\mathcal{P}(A \times B)|$ .

**4** (5 pts). Write a truth table for the following logical statement,  
 $(p \wedge q) \Rightarrow (\sim q)$ .

**5** (10). Let  $P$  and  $Q$  be the compound logical statements given by  $P = p \vee (q \wedge (\sim p))$  and  $Q = p \Leftrightarrow q$ . Then use a truth table to determine if  $P$  implies  $Q$ ,  $Q$  implies  $P$ ,  $P = Q$  or none of the above are true.

**6** (10). For the following statements, define break it up into the smallest simple statements  $p, q, r, s, t, \dots$  (you may not need all of these) possible. Define your simple statements, then rewrite the sentence using symbolic logic.

**Statement 1.** *If  $f$  is a function, then  $f$  has a constant derivative if and only if  $f$  is linear.*

Note you don't have to determine the truth value of the statement, you just need to write it.